March 19, 1935. W. D. GRAY ET AL 1,995,060

STONE CHANNELING BIT

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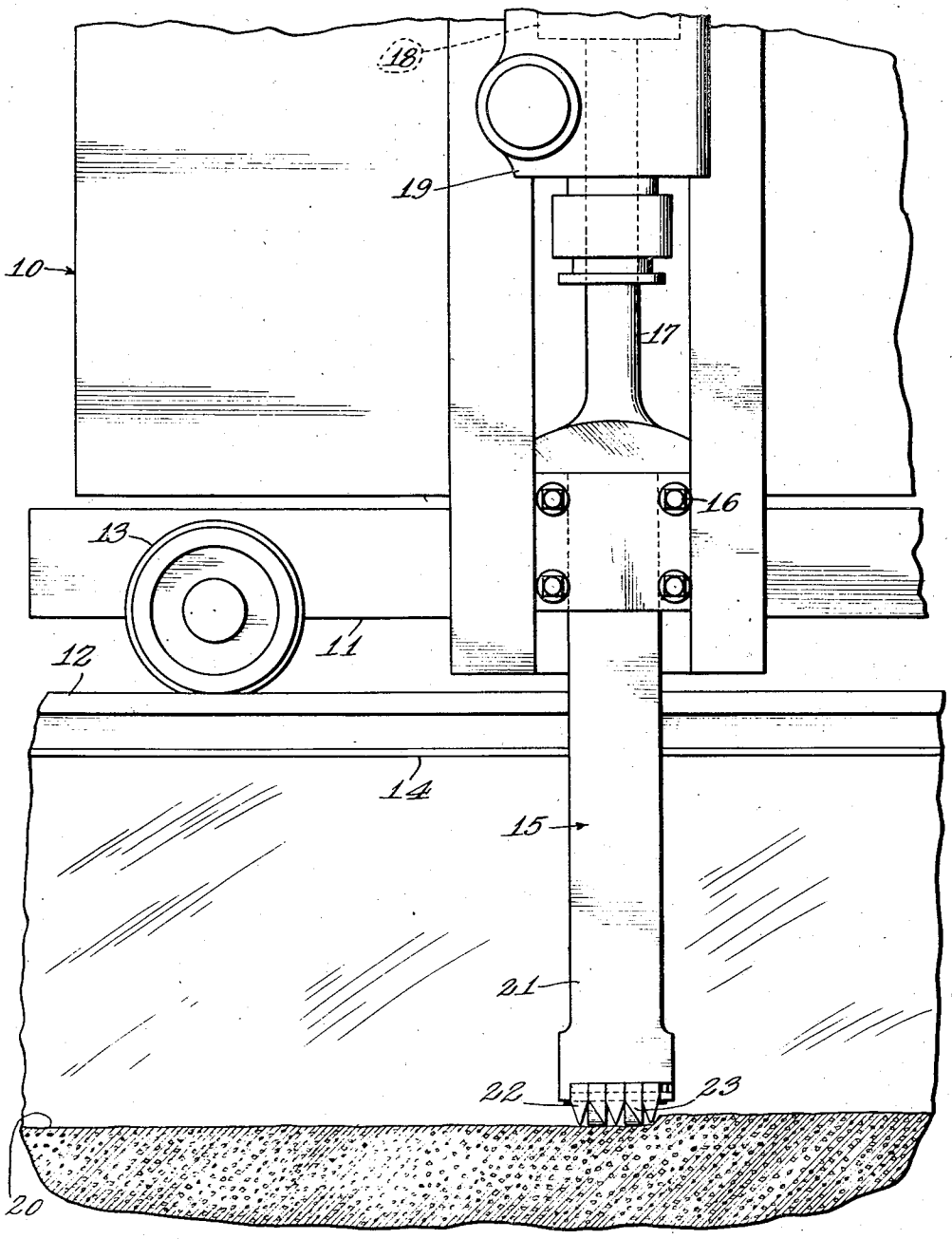


Fig. 1

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Fig. 2

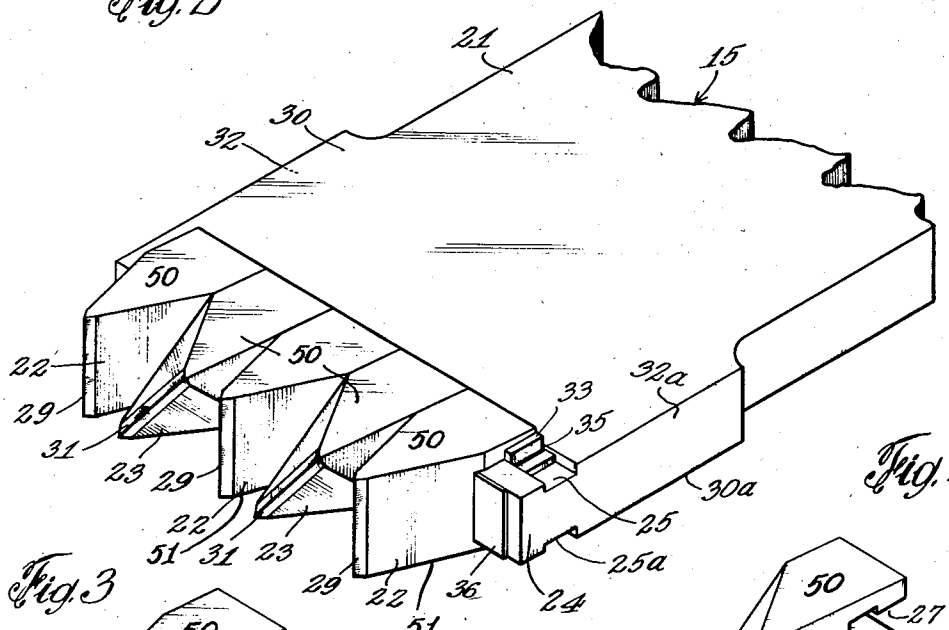


Fig. 3

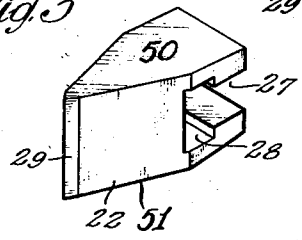


Fig. 4

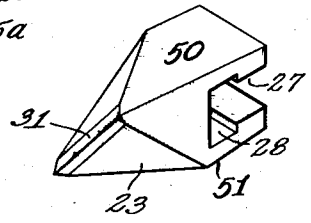


Fig. 5

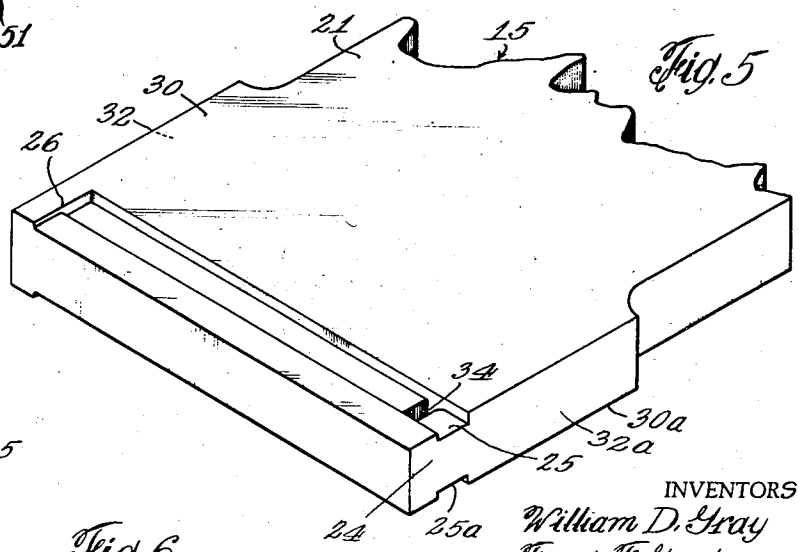
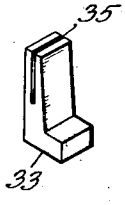


Fig. 6



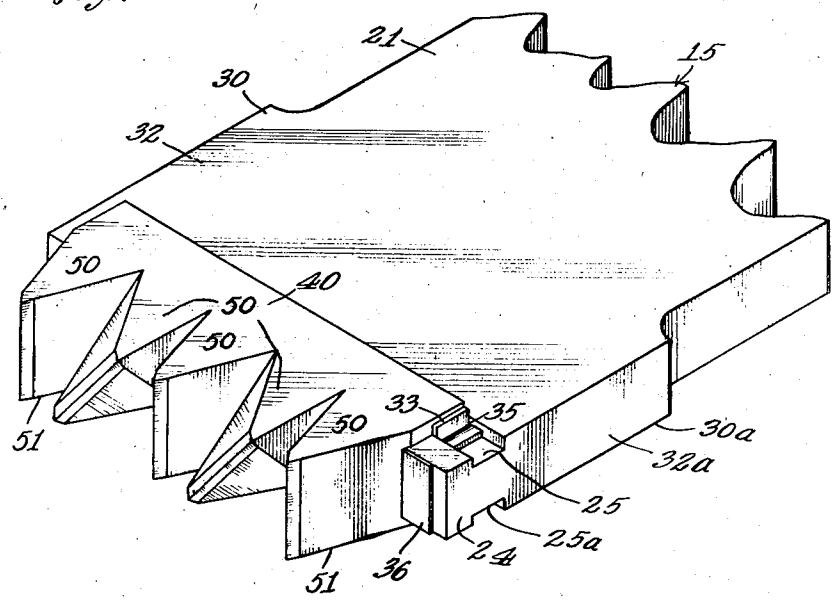
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Fig. 7



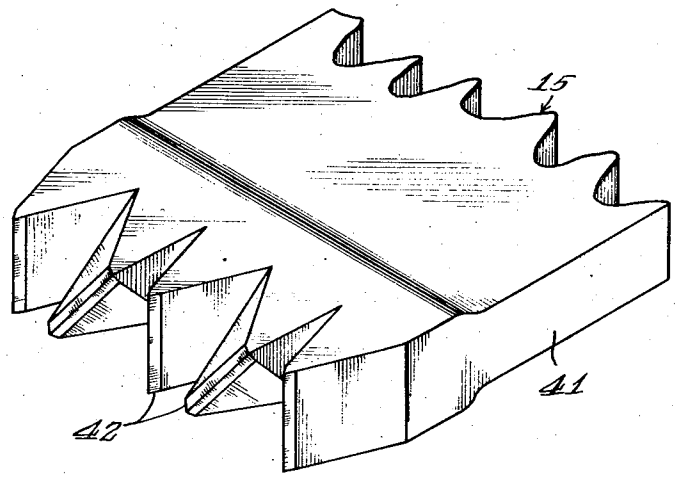


Fig. 8

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UNITED STATES PATENT OFFICE

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STONE CHANNELING BIT

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Application November 12, 1932, Serial No. 642,340

16 Claims. (Cl. 262—33)

This invention relates to an improvement in bits for channeling stone such as marble and to the end that a clear understanding of the invention may be had, it is desirable to briefly consider the manner of quarrying marble and the difficulties which are incident thereto.

In removing marble from the floor of the quarry, a channeling machine mounted to roll on a track is employed and consists primarily of a rod reciprocated by a suitable piston. The stroke of the piston is variable and when quarrying relatively hard rock is adjusted to produce short rapid strokes. Secured to this piston rod, in the prior constructions, are a plurality of long, relatively slender channeling bits or bars; these bits are firmly secured at their upper ends to the piston rod but at their lower ends are unsupported because any clamp necessarily would 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 block of marble or other stone thus quarried has side faces which are very irregular. Consequently, the blocks after being removed from the floor of the quarry must be cut square, thus increasing the cost of production and resulting in a loss of marble.

The above disadvantage of the individual bar bits of past practice is obviated by the present invention, the principal object of which is the provision of a rigid stone channeling bit comprising a single unitary slab-like shank at one end adapted to be secured to a reciprocal piston rod and at the other provided with a plurality of stub cutting edges either formed integral with or removable from the shank.

In some instances, such as when quarrying hard stone or particularly hard grades of marble, the cutting edges of the individual bar bits of prior use wear rapidly, necessitating frequent withdrawal of the bits during cutting operations for sharpening. Because of this, a large supply of bits of different lengths must be kept in stock to meet the demand for replacement. Frequent replacement causes costly delays and necessitates an expensive inventory of bars. These disadvantages are overcome by this invention which has for another object the provision of a stone channeling bit comprising a single unitary slab-like shank and a stub cutter or a plurality of stub cutters removably attached to one end of the shank. In carrying out this object, the shank and the cutter or cutters are each provided with one element of a key and groove arrangement whereby the cutter or cutters may be firmly but removably secured to the shank.

It is a still further object of our invention to provide a stone channeling bit of the character specified in which the cutting members are composed of metal having greater abrasive resisting qualities than the material of the shank.

Other objects and advantages of our invention such as the novel method of mounting the cutters on the shank so that they may be readily removed, will appear in the following specification accompanying the drawings, in which

Fig. 1 is a side elevation of a stone channeling machine, showing the preferred form of the invention in position;

Fig. 2 is an isometric view of a portion of the stone channeling bit of the preferred construction;

Fig. 3 is an isometric view of one of the cutters of the channeling bit of Fig. 2;

Fig. 4 is an isometric view of another of the cutters of Fig. 2;

Fig. 5 is an isometric view of a portion of the slab-like shank of the channeling bit;

Fig. 6 is an isometric view of the keeper key which locks the cutters upon the shank;

Fig. 7 is a view similar to Fig. 2 illustrating a modification of the invention, and

Fig. 8 is likewise similar to Fig. 2 illustrating another modification of the invention.

Referring now to Figures 1 to 6 inclusive, which disclose the preferred form of the invention, a channeling machine is indicated generally at 10 and it includes a frame 11 which is supported on rails 12 by flanged wheels such as 13. The rails rest upon the floor 14 of a quarry and serve as runways for the channeling machine 10 as it moves back and forth on the rails during the operation of the machine. 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 machine. The channeling machine 10 is moved back and forth along the rails 12 by suitable mechanism. As the channeling bit 15 is reciprocated by the piston 18, it cuts grooves such as 20 (Fig. 1) in the floor of the quarry.

The channeling bit of the preferred construction consists of the shank or cutter head 21 which is made in the form of a solid slab of iron or steel and the stub cutters 22, 23 detachably mounted and locked on or at one end of the shank as will presently appear. It is of course

understood that when the channeling bit 15 shown in Figure 1 has cut a channel of a predetermined depth, that is, when the greater part of the shank 21 has entered the channel so cut, it is then removed and a channeling bit of the next size substiuted so that the cut may be continued to the desired depth. The grooves or channels so cut may be of any depth or length, depending upon the size of stone which is desirable or possible to quarry. In some instances the cut is eight feet or more in depth. In some instances, it may be advantageous to employ a single block cutter, as shown at 40 in Fig. 7, instead of the plurality of small cutters as illustrated in Fig. 2. Whether one or a plurality of cutters are used the invention contemplates making the cutter of an alloy steel having greater abrasive resisting qualities than the material of the shank. Thus, the construction provides a firm rigid shank of tough and comparatively inexpensive material and cutters of a more expensive material but such that will retain its cutting edge and minimize withdrawals of the bit, when in operation, for the purpose of sharpening the cutters.

This channeling bit has proven its utility in quarrying "Cardiff Green" marble. When applied to a channeling machine of the character heretofore described, the bit of our preferred construction is capable of channeling marble at a rate between 8 to 10 square feet per hour as compared with a rate of 3 to 5 square feet per hour with the bar bits of prior use; and the block is cut with practically straight sides in contrast with serpentine sides when cut with the individual bar bits.

An important feature of the novel bit is the key and groove arrangement for detachably securing the cutters to the shank. The key 24 is formed along the lower marginal edge of the shank by the opposed recesses 25, 25*a* in the side faces of the shank, which recesses at one end are open and at the other are closed or crossed by the shoulder 26. This shoulder also extends across the corresponding end of the key 24.

The cutters 22, 23 have formed therein the slot 27 and the groove or keyway 28 of a size to snugly fit the recesses 25, 25*a* and the key 24 respectively, of the shank. As shown, the cutting edge 29 of the cutter 22 is disposed perpendicular to the plane of the shank side faces 30, 30*a*, and the cutting edge 31 of the cutter 23 positioned diagonally of the plane of the shank end faces 32, 32*a*. It will also be apparent that the cutting edge of each cutter extends transversely between the cutter side faces 50, 51 and, preferably, the lateral extremities of each cutting edge extend beyond the plane of the shank side faces so that the kerf or channel as cut in the marble will be of sufficient width to accommodate the shank. These cutters are assembled on the shank by engaging the cutter groove or keyway 28 on the key 24 of the shank and sliding the cutters thereon against the shoulder 26. Preferably, five cutters are employed. Three are of the form of the cutter 22 and the other two are of the form of the cutter 23. The latter are disposed intermediate the former as illustrated in Fig. 2. After the cutters are assembled on the shank they are locked in place by the keeper key 33 passing through the slot 34 disposed adjacent the open end of the recesses 25, 25*a*. The keeper key has a portion thereof saw cut as at 35 so that it may be spread open as shown in Fig. 2. Should wear occur between the key 24 of the shank and the groove 28 of the cutters, it can be compensated for by the insertion of a shim as at 36.

The modification of the invention illustrated in Fig. 7 has been referred to heretofore and differs from the preferred construction only in that the single block cutter 40 is employed in place of the cutters 22 and 23. Fig. 8 illustrates another embodiment of the invention wherein the channeling bit consists of the single unitary slab-like shank 41 provided with a plurality of integral cutters 42 at an end thereof. This slab-like bit is particularly useful for channeling comparatively soft stone or where frequent withdrawals of the bit for sharpening is not necessary.

Those familiar with quarrying operations will recognize that our invention is a noteworthy improvement in the construction of channeling bits and that various changes in form may be made without departing from the scope of the appended claims.

We claim:

1. A stone channeling bit comprising a relatively long slab-like shank having flat side faces and a plurality of relatively short stub cutters removably secured to one end of said shank, said stub cutters having cutting edges which extend transversely of the flat side faces of said shank, the last named end of said shank and said cutters each being provided with one element of a key and groove arrangement cooperating for detachably mounting said cutters upon said shank, each stub cutter having side faces and a cutting edge extending transversely of said side faces, the cutting edges of any adjacent stub cutters being spaced apart from each other throughout their length, and said tool being arranged with no part thereof extending beyond the lateral extremities of the cutting edges.

2. A stone channeling bit comprising a relatively long slab-like shank having flat side faces, a plurality of relatively short stub cutters removably secured to one end of said shank, said stub cutters having cutting edges which extend transversely of the flat side faces of said shank, the last named end of said shank and said cutters being provided with one element of a key and groove arrangement cooperating for detachably mounting said cutters upon said shank, each stub cutter having side faces and a cutting edge extending transversely of said side faces, the cutting edges of any adjacent stub cutters being spaced apart from each other throughout their length, and said tool being arranged with no part thereof extending beyond the lateral extremities of the cutting edges, and means for locking said cutters to said shank.

3. A stone channeling bit comprising a shank, a plurality of cutters interfitted with one end of said shank, said cutters being inserted from one side edge of said shank toward the opposite side edge thereof, a shoulder adjacent the last named side edge of said shank forming a stop for limiting the movement of said cutters thereto, each stub cutter having side faces and a cutting edge extending transversely of said side faces, the cutting edges of any adjacent stub cutters being spaced apart from each other throughout their length, and said tool being arranged with no part thereof extending beyond the lateral extremities of the cutting edges, and means passing into the named end of said shank and adjacent said first named side edge for locking said cutters to said shank.

4. A stone channeling bit comprising a shank, a plurality of cutters interfitted with one end of said shank, each stub cutter having side faces and a cutting edge extending transversely of said side faces, the cutting edges of any adjacent stub cutters being spaced apart from each other throughout their length, and said tool being arranged with no part thereof extending beyond the lateral extremities of the cutting edges, a shoulder adjacent one side edge of said shank and a keeper key passing through the last named end of said shank and adjacent the opposite side edge thereof, said shoulder and said keeper key locking said cutters therebetween.

5. A stone channeling bit comprising a shank, a groove adjacent one end face of said shank and opening toward a side edge thereof, a shoulder crossing said groove adjacent the opposite side edge of said shank, a plurality of cutters interfitted with said groove and inserted from the open end thereof toward said shoulder, each stub cutter having side faces and a cutting edge extending transversely of said side faces, the cutting edges of any adjacent stub cutters being spaced apart from each other throughout their length, and said tool being arranged with no part thereof extending beyond the lateral extremities of the cutting edges, and a keeper key passing into said shank adjacent the open end of said groove, said keeper key and shoulder cooperating to lock said cutters therebetween.

6. A stone channeling bit comprising a shank, a groove formed in a side face of said shank and opening toward a side edge thereof, a shoulder crossing said groove adjacent the opposite side edge of said shank, a plurality of cutters interfitted with said groove and inserted from the open end thereof toward said shoulder, each stub cutter having side faces and a cutting edge extending transversely of said side faces, the cutting edges of any adjacent stub cutters being spaced apart from each other throughout their length, and said tool being arranged with no part thereof extending beyond the lateral extremities of the cutting edges, said groove adjacent its open end provided with an opening, and a keeper key fitted into said opening, said keeper key and shoulder cooperating to lock said cutters therebetween.

7. A stone channeling bit comprising a shank, a groove on each side face of said shank and opening toward a common side edge thereof, a shoulder crossing each of said grooves adjacent the opposite side edge of said shank, a plurality of cutters inserted from the open ends of said grooves toward said shoulders, said cutters provided with means engaging said grooves whereby said cutters are interfitted with said shank, each stub cutter having side faces and a cutting edge extending transversely of said side faces, the cutting edges of any adjacent stub cutters being spaced apart from each other throughout their length, and said tool being arranged with no part thereof extending beyond the lateral extremities of the cutting edges, an aperture extending from one groove to the other adjacent their open ends, and a keeper key passing through said aperture, said keeper key and shoulders cooperating to lock said cutters therebetween.

8. A stone channeling bit comprising a shank having side faces and edges, one end of said shank being arranged for attachment to a reciprocating member and a plurality of stub cutters interfitted with the other end of said shank and extending but a short distance therebeyond, such plurality of stub cutters comprising a stub cutter adjacent each side edge, such stub cutters each having a cutting edge which is perpendicular to the plane of a side face of said shank, and a stub cutter disposed between said first named stub cutters, said last named stub cutter having a cutting edge which is transverse of the cutting edges of said first named stub cutters, each stub cutter having side faces and a cutting edge extending transversely of said side faces, the cutting edges of any adjacent stub cutters being spaced apart from each other throughout their length, and said tool being arranged with no part thereof extending beyond the lateral extremities of the cutting edges.

9. A stone channeling bit comprising a shank having side faces and edges, one end of said shank being arranged for attachment to a reciprocating member and a plurality of stub cutters interfitted with the other end of said shank and extending but a short distance therebeyond, such plurality of stub cutters comprising a stub cutter adjacent each side edge, such stub cutters each having a cutting edge which is perpendicular to the plane of a side face of said shank and a plurality of stub cutters disposed between said first named stub cutters, each of said last named cutters having a cutting edge which is transverse of the cutting edges of said first named stub cutters, each stub cutter having side faces and a cutting edge extending transversely of said side faces, the cutting edges of any adjacent stub cutters being spaced apart from each other throughout their length, and said tool being arranged with no part thereof extending beyond the lateral extremities of the cutting edges.

10. A stone channeling bit comprising a shank having side faces and edges, one end of said shank being arranged for attachment to a reciprocating member and a plurality of stub cutters interfitted with the other end of said shank and extending but a short distance therebeyond, such plurality of stub cutters comprising a stub cutter adjacent each side edge and a stub cutter disposed intermediate the end stub cutters and spaced apart therefrom, such stub cutters each having a cutting edge which is perpendicular to the plane of a side face of said shank, and a stub cutter disposed between each end stub cutter, and intermediate stub cutters, said last named stub cutters each having a cutting edge which is transverse of the cutting edges of said first named stub cutters, each stub cutter having side faces and a cutting edge extending transversely of said side faces, the cutting edges of any adjacent stub cutters being spaced apart from each other throughout their length, and said tool being arranged with no part thereof extending beyond the lateral extremities of the cutting edges.

11. A shank for a stone channeling bit comprising side faces, side edges and an end face, a groove formed in each side face of said shank adjacent said end face and parallel thereto, said grooves each opening toward a common side edge, and a shoulder crossing each groove adjacent the opposite side edge of said shank.

12. A shank for a stone channeling bit comprising side faces, side edges and an end face, a groove formed in each side face of said shank adjacent said end face and parallel thereto, said grooves each opening toward a common side edge, an aperture extending from one groove to the other adjacent their open ends, and a shoulder

crossing each groove adjacent the opposite side edge of said shank.

13. A stone channeling tool including a relatively long slab-like shank having flat side faces and stub cutters, one end of said channeling tool being arranged for attachment to a reciprocable member and the other end thereof removably carrying the named stub cutters, each stub cutter having side faces and a cutting edge extending transversely of said side faces, the cutting edges of any adjacent stub cutters being spaced apart from each other throughout their length, and said tool being arranged with no part thereof extending beyond the lateral extremities of the cutting edges.

14. A stone channeling tool including a relatively long slab-like shank having flat side faces, and a plurality of relatively short stub cutters detachably carried by said shank at one end thereof, each stub cutter having side faces and a cutting edge extending transversely of said side faces, the cutting edges of any adjacent stub cutters being spaced apart from each other throughout their length, and said tool being arranged with no part thereof extending beyond the lateral extremities of the cutting edges.

15. A stone channeling tool including a relatively long slab-like metal shank having flat side faces and a plurality of relatively short stub cutters, said stub cutters being formed of a metal having a higher abrasive resistance than said shank, one end of said channeling tool being arranged for attachment to a reciprocable member and the other end thereof removably carrying the plurality of stub cutters, each stub cutter having side faces and a cutting edge extending transversely of said side faces, the cutting edges of any adjacent stub cutters being spaced apart from each other throughout their length, and said tool being arranged with no part thereof extending beyond the lateral extremities of the cutting edges.

16. A cutter for a stone channeling tool having substantially parallel side faces, a cutting edge extending transversely of the planes of said side faces, and an element of a key and groove connection included between the planes of said side faces, the distance between the parallel side faces adjacent said cutting edge being at least as great as the distance between the parallel side faces adjacent said key and groove connecting element.

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