

B. A. WESTERLING & A. P. HEDBERG.

STONE CUTTING MACHINE.

APPLICATION FILED NOV. 7, 1910.

Patented July 9, 1912.

3 SHEETS-SHEET 1.

1,031,756.

FIG. 1.

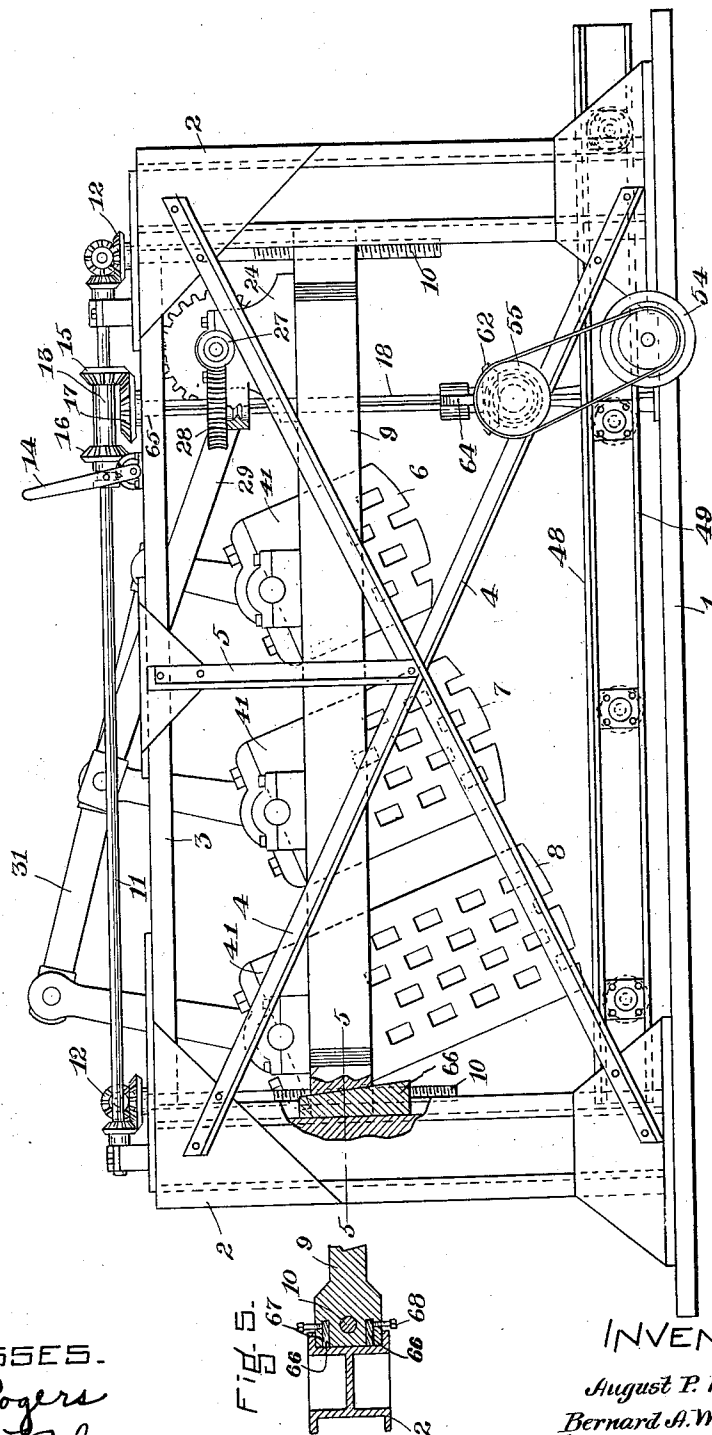
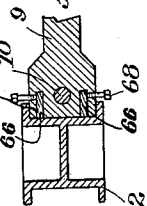


FIG. 5.



WITNESSES.

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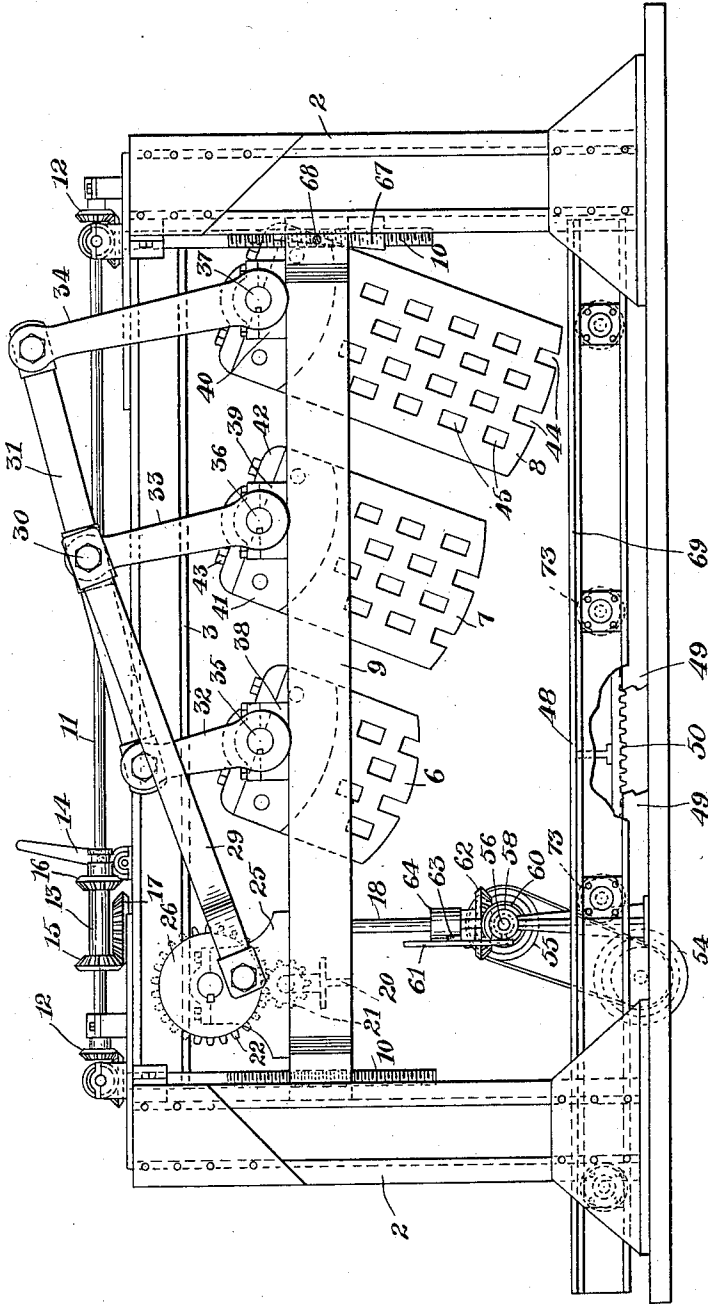
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3 SHEETS-SHEET 2.

FIG. 2.



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3 SHEETS—SHEET 3.

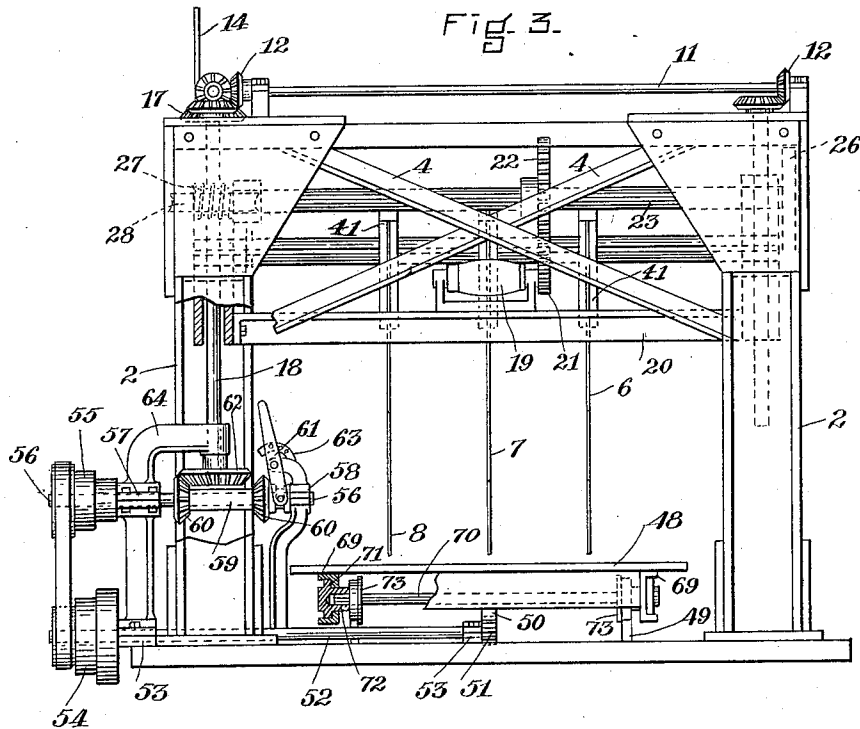
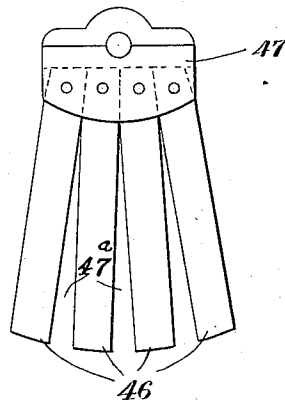


Fig. 4.



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UNITED STATES PATENT OFFICE.

BERNARD A. WESTERLING, OF HOPKINTON, AND AUGUST P. HEDBERG, OF MILFORD,
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STONE-CUTTING MACHINE.

1,031,756.

Specification of Letters Patent.

Patented July 9, 1912.

Application filed November 7, 1910. Serial No. 591,125.

To all whom it may concern:

Be it known that we, BERNARD A. WESTERLING, a citizen of the United States, and a resident of Hopkinton, in the county of Middlesex and State of Massachusetts, and AUGUST P. HEDBERG, a citizen of the United States, and a resident of Milford, in the county of Worcester and State of Massachusetts, have invented an Improvement in Stone-Cutting Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to stone cutting machines of the type wherein the stone is relatively fed into engagement with an oscillating plate or plates, a suitable abrasive, as steel shot and water being supplied at the line of engagement, to effect the cutting action.

The objects of the invention are to produce a machine having a greatly increased capacity for work over those now in use, to provide a strong, compact, thrust-resisting disposition of parts, a simple, powerful drive, and various economies and conveniences in operation, all as will hereafter more fully appear.

In the comprehensive embodiment shown, a plurality of sets of plates or blades arranged for simultaneous operation, are provided, the several plates of each set being arranged for successive action upon the stone as it is fed along relative thereto, and the several sets of plates having provision for mutual adjustment.

Referring to the accompanying drawings for a more complete understanding of a preferred embodiment of the invention, Figure 1 is a side view of one side of the machine with a detail broken away in section and certain parts of the other side of the machine being omitted; Fig. 2 is a side view of the opposite side of the machine from Fig. 1; Fig. 3 is an end view of the right-hand end of the machine as seen from Fig. 1; Fig. 4 is a detail view of a modified form of cutting plate or blade; and Fig. 5 is a detail sectional view of an adjusting means on line 5—5, Fig. 1.

Upon a suitable base 1 a set of columns or standards 2, preferably consisting of flanged bars, are fixed, and these are joined at the top by a frame work 3, the whole being strongly bolted, and braced as by diagonal braces 4 and tie braces 5 to provide a rigid frame work.

The sets of cutting blades or plates 6, 7, 8 and the driving gearing therefor are mounted on a horizontal support 9 and adapted to be vertically adjusted therewith by means of the threaded rods 10, the ends of the support 9 being guided in the flanged columns 2, which thus take the end thrusts therefrom in the operation of the machine, as clearly appears in Fig. 5. The several threaded bolts 10 are connected for simultaneous operation by suitable connecting shafting 11 and bevel gearing 12 from the spool 13 slidably splined on a shaft 11 with an operating handle 14 and reversely facing bevel pinions 15, 16 fixed thereon, one or the other of which may at option be engaged with the vertical bevel pinion 17 fixed on the upper end of vertical shaft 18, which is driven as hereinafter explained. The bevel pinions 15, 16 are spaced apart so that both are disengaged from the driving pinion 17 when in intermediate position. It is apparent that the tool support may be raised or lowered at will by manipulating the handle 14 to throw either of the bevel pinions 15 or 16 into driving engagement with the pinion 17.

A driving motor 19 for the machine is mounted on a cross rail 20, suitably bolted to the support 9, and transmits power by means of a pinion 21 to a large gear 22 on a main drive shaft 23. The main drive shaft 23 is journaled in suitable bearings 24, 25, on the support 9 and has at one end a crank disk 26 for operating the cutting blades, and at its other end a worm 27 to gear with a worm wheel 28 slidably splined on shaft 18 for operating the table feed, and, when desired, the vertical power adjustment of the cutting blades just explained. The crank disk 26 transmits driving impulse to oscillate the cutting blades through a pitman 29, which at its outer end is pivoted at 30 to a link 31, which in turn is

pivotaly connected to operating arms 32, 33, 34, for the respective series of plates 6, 7, 8. It is to be understood that in case a large number of cutting blades are to be operated, imposing heavy duty on the driving connections, another crank disk similar to disk 26 may be placed upon the opposite end of the shaft 23 and driving connections made to the other end of shafts 35, 36 and 37 similar to those just described.

As shown, three sets of blades are provided (see Fig. 3) and a series of three blades 6, 7, 8 for each set, as shown in Fig. 2, but this in each case is merely illustrative, and our invention contemplates the provision of any desired number of sets of blades as well as any suitable number of blades in each set. The series of blades 6, 7, 8 are of successively increasing length and are mounted upon respective shafts 35, 36 and 37 in driven engagement therewith, with provision for longitudinal adjustment therealong, as by suitable splined connection or the like. The several shafts 35, 36, 37 are mounted in bearings 38, 39, 40, on the support 9 so as to lie in a common plane, which is substantially parallel to the base of the machine, and thus the arcuate operative edges of the blades 6, 7, 8, which as described are of progressively increasing length, will be disposed in a general direction at an acute angle to the base and the work table thereon, resulting in a deeper projection of the succeeding blades of each set into the material until it is completely or substantially severed by the blades 8. The several arms 32, 33 and 34, which are fixed to the shafts 35, 36 and 37, are of successively increasing length to correspond with the lengths of the blades 6, 7, 8, respectively, so that like driving impulse will be imparted to the operative edges of each of the blades of a set from the pitman 29.

The respective blades are clamped in suitable holders 41, which assist in rendering them stiff and rigid in use, and these holders are secured in any desired position along the shafts 35, 36, 37, by having separable cap portions 42 thereof firmly drawn into secure engagement with said shafts as by bolts 43. In the form shown in Figs. 1 and 2, each blade is formed of an integral plate having sets of holes along the length thereof. In practice, plates of the length requisite for those shown at 8 are selected, the outermost pair or set of holes 44 being open at the outer edge of the plate, and serving as pockets to hold and move the steel shot or other abrasive back and forth in the cutting operation. As the plate becomes worn down so that these holes become shallow or disappear, the outer sides of the next pair or set 45 will be opened so that these will

in turn serve as shot holding pockets; in like manner each successive set of holes along the length of the blade performs this office until the blade is worn out. As the blades 8 are worn down too short to occupy this position they are transferred to constitute blades 7 in the intermediate position, and as these in turn are shortened still further in wear they are transferred to become the shortest or initial cutting blades 6. At intermediate stages in the wear of the several blades of each set they may be simultaneously adjusted to occupy positions for proper cutting action by the adjustment of their common support 9 already described. The several sets of blades 6, 7, 8 may be adjusted along their driving shafts so as to be spaced apart any desired distance for the particular work in hand, and as before stated, any suitable number of sets of blades may be employed.

In Fig. 4 a modified form of cutting plate or blade is shown; in this case a plurality of long relatively slim blade portions 46 are clamped in a holder 47 which is similar to the holder 41. These blades diverge from their common holder so as to form spaces therebetween at the operative edges thereof, which serve as shot holding pockets in like manner as the pockets 44, 45 before described. The work to be operated on is fed through the machine on a table or car 48, which runs on a track 49. The car has bolted to its bottom a rack 50 which is driven by a pinion 51 on a shaft 52, which is journaled in suitable bearings 53 in the base. The shaft 52 has formed on its outer end a cone pulley 54 in belted connection with a corresponding cone pulley 55 on a shaft 56, which has bearings in uprights 57, 58, and has slidably splined thereon a spool 59 carrying a pair of oppositely facing bevel pinions 60. An operating handle 61 is adapted to shift said spool so that either of the pinions 60 will at option engage and be driven by pinion 62 on the vertical shaft 18 before described. Suitable means, shown conventionally at 63, may be provided so that the spool 59 may be held in either extreme position, or in an intermediate position where neither driven pinion will be engaged with the driving pinion 62. This provides means whereby the table can be moved in either direction or entirely disconnected from the driving motor. The shaft 18 is suitably journaled at its lower end in a bracket 64 projecting from the upright 57 and at its upper end has bearing in the frame at 65.

It is apparent that in use the support 9 will receive a constant succession of end thrusts from the operation of the cutting blades, to be transmitted to the columns 2.

It is therefore highly important that there should be no end play or looseness between these elements, which would result in a hammering action, very destructive to the apparatus. To provide against this, (in addition to having the oscillating axes in a horizontal plane parallel to the work support and perpendicular to the columns 2, as distinguished from being in an oblique line or plane) tapered keys or wedges 66 are mounted in corresponding open recesses 67 in the ends of the support 9, and these may be readily adjusted and held by proper set screws 68 so as to take up all wear between the parts and make the entire structure absolutely rigid and unyielding whenever the hammering action has racked the parts loose. In this connection it is to be observed that all thrusts and stresses from the cutting operation are taken up by the interbraced and supported columns and base, thus resulting in a completely balanced and very substantial structure.

The car 48 is desirably constituted of a platform mounted on suitable flanged bars 69, these being apertured at intervals to receive the bearings for the car axles. It is sometimes desirable to remove a wheel or axle without wholly dismantling the car, and to readily effect this the several axles 70 are mounted in bearing blocks or bushings 71, which are removably secured in the apertures of bar 69 and are embraced by the flanges thereof. These bushings extend inward from the web of bar 69 as at 72 and form bearings for the axle 70, so that the axles do not extend more than a short distance at most within the bar 69. These inwardly projecting portions 72 may likewise extend into engagement with the car wheels 73 and thus serve as spacers to determine the alinement thereof. By removing the bearing blocks 71 from the ends of an axle 70 such axle may be slightly moved endwise and at once taken out of the car without any further disassemblage of parts except a removal of a plank of the car platform if the car happens to be in place on the machine. The construction of apertured flange bars 69 with bearing blocks fitted through the webs thereof to receive the car axles, is an important feature of novelty in that it brings the car platform down very low and close to the base, whereby it is more stable in use and less subject to vibration or displacement in the cutting operation.

In practice, a plurality of cars 48 may be provided so that as one is moved through the machine and its load is being cut, another is being loaded, thus enabling continuity of operation. The cars are passed through the machine from right to left, as

shown in Fig. 1, and a proper supply of steel shot and water or other known abrasive is fed into the machine at the point of initial engagement of the blades 6 with the work. These blades, the shot and water being moved back and forth in the open pockets at the ends thereof, will thus make a cut of determinate depth in the work, the shot and water gradually working along down to the point of initial engagement of the blades 7, which operate in like manner and deepen the cut, and thence the shot progress along down to the pockets of the blades 8, which in the illustrative embodiment, finish the cutting operation; the shot may then be collected and washed and used over again.

The blades are set at a considerable forward incline to the advancing work, this having been found in use to be the most efficient arrangement.

The arrangement of multiple sets of blades and the plural series of individual blades working in a single cut make the operation of cutting very expeditious, resulting in a largely increased capacity in comparison with the machines hitherto in use, while the simple, compact construction affords economies in operation, and the improved driving arrangement effects saving in power requisite for operation.

All the operative parts are mutually braced and absolutely rigid, so that all chattering or jumping which could result in irregular, imperfect work, is eliminated.

Having described our invention, what we claim as new and desire to secure by Letters Patent is,

1. A stone cutting machine, comprising a work support, a tool support, a plurality of shafts journaled in said tool support, a plurality of oscillating tools fixed on each shaft, of different lengths for each shaft, operating arms for the several shafts varied in length corresponding to the lengths of the tools on the respective shafts, and a common operating means for said arms.

2. A stone cutting machine, comprising a base, a movable work table mounted thereon, a tool support, and means for adjusting it toward and from said work table, sets of oscillating tools one ahead of another journaled in said tool support, a common operating means therefor, a prime mover connected with said operating means also mounted on said tool support, and means for transmitting driving impulse from said prime mover to operate said work table irrespective of the adjustment of said tool support.

3. A stone cutting machine, comprising fixed spaced apart vertical columns having rigid interbracing, a movable horizontal

work table, a horizontal tool support vertically adjustable on said columns and abutting thereagainst, a plurality of oscillating tools mounted on said tool support on axes
5 parallel to one another, said tools being of progressively increasing length from one end of the tool support to the other, and means for simultaneously operating said tools carried by said tool support.

In testimony whereof, we have signed our names to this specification, in the presence of two subscribing witnesses.

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AUGUST P. HEDBERG.

Witnesses:

JOHN A. FINNIGAN,
CHAS. F. AUSTIN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."