Jan. 30, 1940. T. SIDERITS 2,188,318

STONE CUTTER

Filed June 4, 1938 2 Sheets-Sheet 1

Fig. 1.

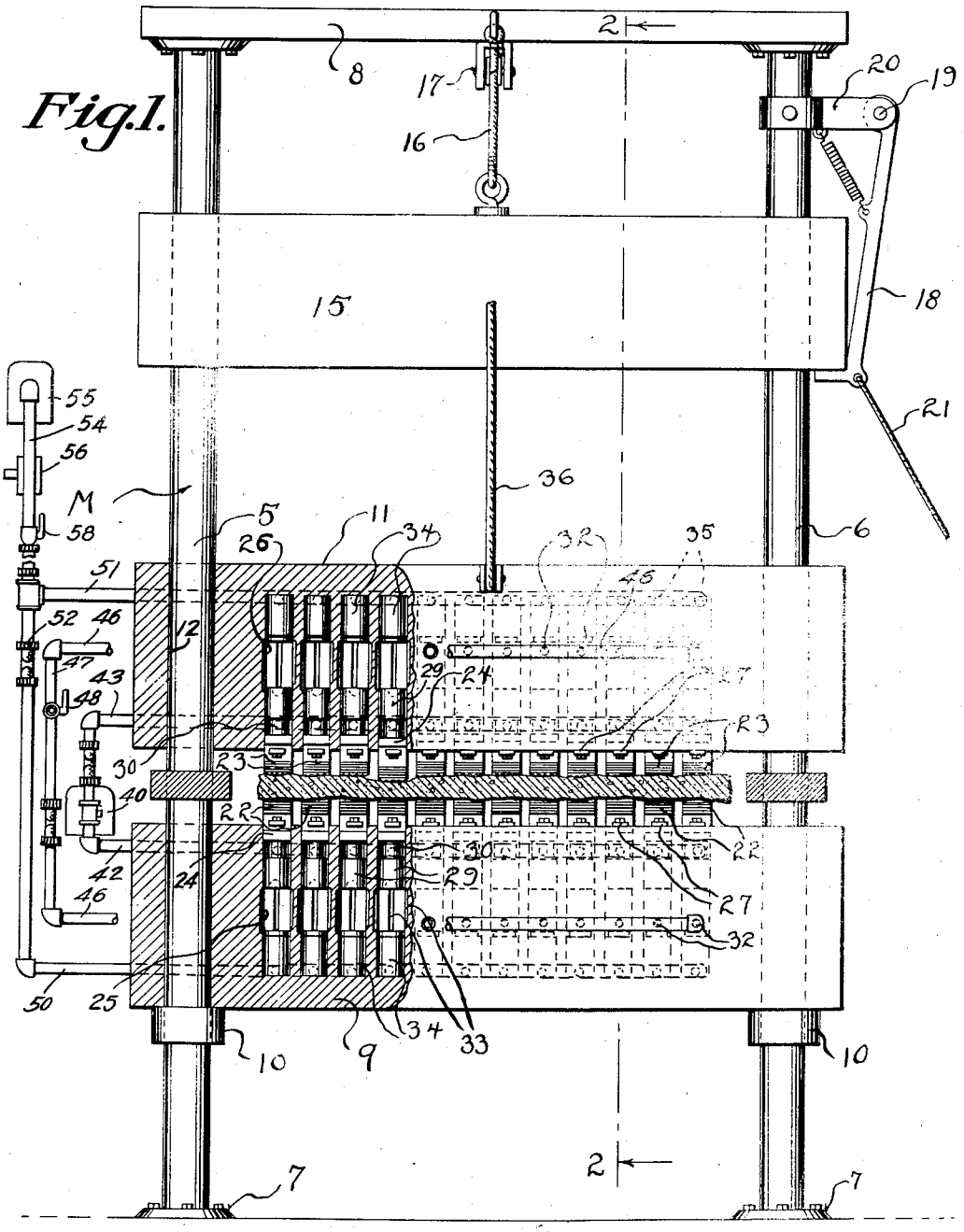

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Fig. 2.

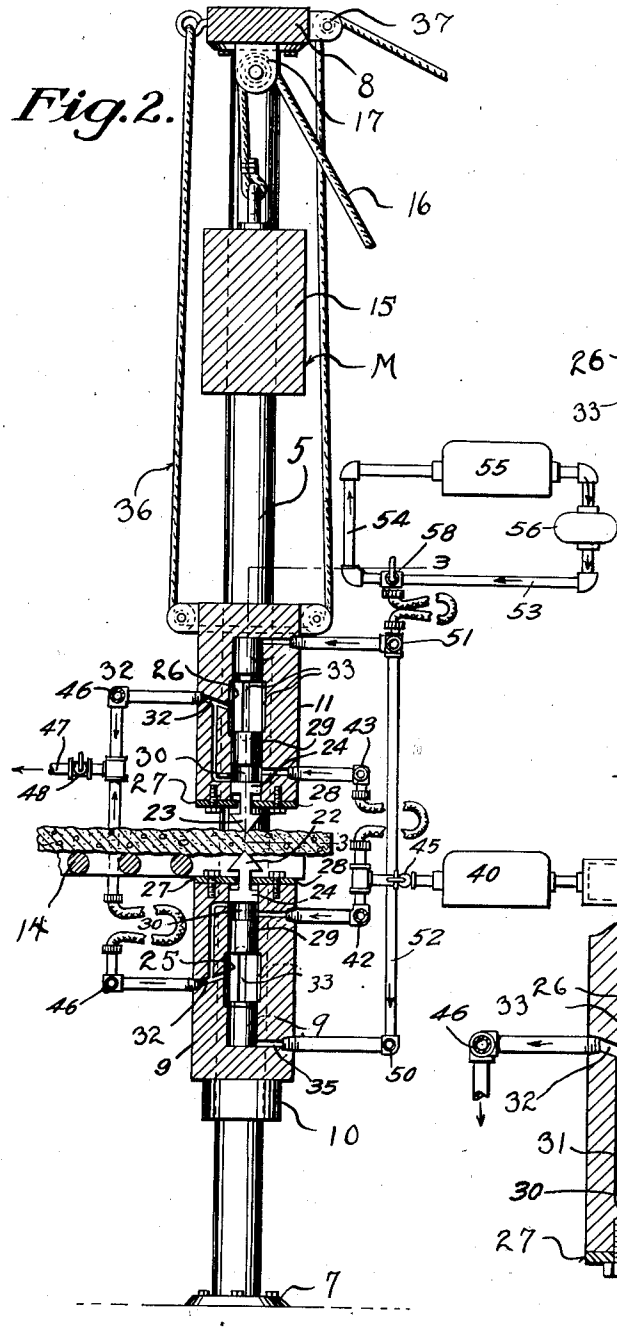


Fig. 3.

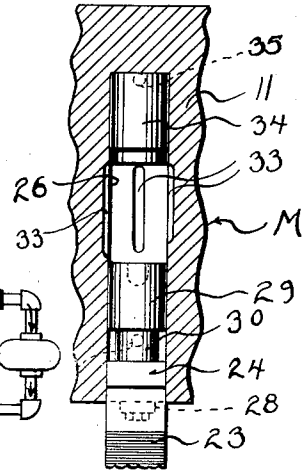
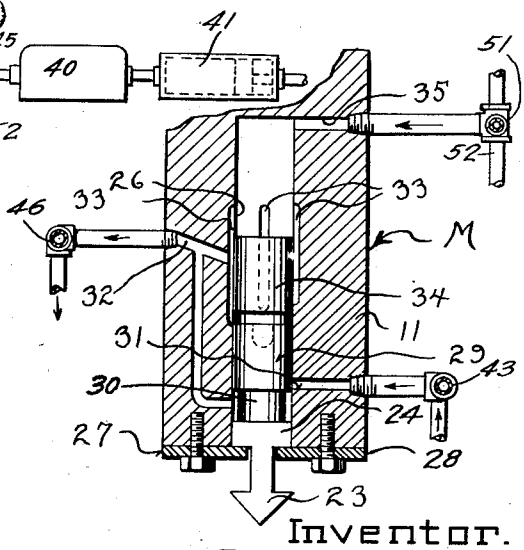


Fig. 4.



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Patented Jan. 30, 1940 2,188,318

UNITED STATES PATENT OFFICE

2,188,318

STONE CUTTER

Thomas Siderits, Milwaukee, Wis.

Application June 4, 1938, Serial No. 211,732

4 Claims. (Cl. 125—23)

This invention appertains to a novel machine for cutting or splitting stone into blocks or slabs of desired sizes.

One of the primary objects of my invention is to provide a stone cutting machine, which will be rapid in action, and in which the stone will be positively severed into the desired sizes without showing any mechanical edges or artificial cuts or saw marks.

Another salient object of my invention is to provide a machine for cutting and splitting stone of any size and dimensions, embodying an anvil or bottom block, and a movable head or upper block, each of said blocks carrying a plurality of independent chisels to engage the varying contour of the stone, with means for rapidly vibrating or reciprocating the chisels to form grooves in the opposite faces of the stone, and means for creating continuous pressure on the chisels for splitting the stone after the formation of the grooves.

Another object of my invention is the provision of independent means—first, for rapidly vibrating or reciprocating the chisels through pneumatic means, and, second, means for forcing the groups of oppositely disposed chisels toward one another through hydraulic means.

A further important object of my invention is to provide a trip-hammer mechanism, whereby the upper head with its chisels can be made to deliver a sharp forcible blow to the stone after the grooves have been cut therein, and the chisels are held against the stone by hydraulic pressure for cracking or splitting large pieces of stone along said grooves, regardless of the contour of the stone surface.

A still further object of my invention is to provide a novel stone cutting or splitting machine of the above character, which will be durable and efficient in use, one that will be simple and easy to manufacture, and one which can be placed upon the market at a reasonable price.

With these and other objects in view, the invention consists in the novel construction, arrangement, and formation of parts, as will be hereinafter more specifically described, claimed, and illustrated in the accompanying drawings, in which drawings:

Figure 1 is a front elevation of my improved machine, with parts thereof broken away and in section to illustrate structural details.

Figure 2 is a vertical sectional view through the machine, taken substantially on the line 2—2 of Figure 1, looking in the direction of the arrows.

Figure 3 is an enlarged, detail sectional view taken through the head or upper block substantially on the line 3—3 of Figure 2, looking in the direction of the arrows.

Figure 4 is a view similar to Figure 3, but looking at right angles thereto, and showing the hydraulic or equivalent means brought into play for forcing the chisels firmly against the stone.

Referring to the drawings in detail, wherein similar reference characters designate corresponding parts throughout the several views, the letter M generally indicates my improved machine for cutting and splitting stone, and, as shown, the same includes a pair of spaced parallel upright standards or posts 5 and 6. The lower terminals of the posts or standards can be provided with any preferred type of feet 7, which can be bolted directly to a floor, bed, or base. The upper ends of the posts are securely fastened to a cross-beam 8, which braces the posts.

Securely fastened to the posts 5 and 6 is a transversely extending anvil or lower block 9. As illustrated, this anvil or lower block 9 rests upon collars 10 or annular enlargements formed on or secured to the posts. Arranged in facing relation to the anvil or lower block 9 is an upper movable head or block 11. The opposite ends of the head or upper block 11 are provided with vertical ways 12, which receive the posts, and thus the head or block is slidably mounted on the posts, whereby stone of varying thickness can be inserted and split between the upper and lower blocks. The frame of the machine can carry side rails 13, and these rails can, in turn, support rollers 14 by means of which stone can be supplied between the blocks. Means is also provided for limiting the downward movement of the upper block 11 relative to the lower block 9, so that mechanism carried by said blocks will not be damaged.

Also slidably mounted upon the posts 5 and 6 is a transversely extending hammer 15, and this hammer is adapted to be raised and then dropped, so that a sharp and forcible impact can be transmitted through the upper block 11 to the stone, as will be set forth later. Any desired means can be provided for elevating the hammer 15, and in the present instance I have shown a hoist rope or cable 16 connected to the hammer. This cable or rope is trained over a pulley 17 connected to the cross-beam 8. Obviously, the cable could lead to a suitable windlass, and by releasing the cable the hammer could be allowed to rapidly fall. If desired, however, a trip 18 of any desired construction can be utilized for holding the ham-

mer in an elevated position, and the trip could be released in any desired manner. As shown, the trip 18 takes the nature of a pawl pivoted, as at 19, to a bracket 20 on the post 6. A pull rope 21 is utilized for moving the pawl out of its operative position relative to the hammer.

The lower block 9 carries a plurality of independently movable chisels 22, while the upper block 11 carries a plurality of independently movable chisels 23. The chisels 22 and 23 are of a similar character, and the chisels each include shanks 24 slidably mounted in bores 25 and 26 formed respectively in the lower block 9 and the upper head 11. The sides of the shanks 24 can be provided with grooves for receiving tongues 27 formed on holding plates 28, which are securely bolted to the opposite sides of the lower and upper blocks 9 and 11. These plates retain the chisels 22 and 23 in position and still allow the rapid movement of the chisels.

The chisels are of such a character as to operate efficiently on stone, and thus the chisels taper to a pointed edge, and the pointed edges can be provided with teeth. Obviously, by having the chisels independently mounted on the heads, the chisels can adjust themselves to the uneven contour of the face of the stone being cut or split.

In accordance with my invention, I propose to first form a groove in the upper and lower faces of the stone, and to then split the stone along the grooves. In order to form the grooves in the upper and lower faces of the stone, means is provided for rapidly vibrating or reciprocating the chisels. Any preferred means can be provided for this purpose, and for the purpose of illustration, I have shown pneumatic means for vibrating or reciprocating the chisels.

Thus, the bores 25 and 26 formed in the lower and upper heads have reciprocally mounted therein air pistons 29. Any preferred means is provided for reciprocating the pistons by air, as is well known in the art. However, as shown, the outer ends of the pistons are reduced in diameter, as at 30, and the bores have communicating therewith adjacent their lower ends, air inlets 31.

When a piston 29 is in its lowered position, its air inlet 31 is partly uncovered by the reduced portion of the piston. The opposite end of each bore is provided with an exhaust port 32. The bores also have the inner ends of their walls provided with air channels or grooves 33. When a piston is in its extreme lowered position, air is permitted to escape from above the piston through the inner exhaust port 32, and the air under the reduced portion of the piston will move the piston to the inner end of the bore. As the piston moves in, the channel 33 will be uncovered, and the air flowing through the channel will act on the inner face of the piston and drive the same down into engagement with its chisel. This movement is continued as long as pressure is admitted into the channel 31. Pressure can be derived for all of the chisels from a common point, and thus the air can be easily controlled to all of the chisels simultaneously.

For the purpose of illustration, I have shown an air storage tank 40, and air under pressure is supplied to the tank through the medium of a pump 41. All of the inlet ports 31 in the lower block or anvil 9 are connected to a manifold pipe 42, and all of the ports 31 in the upper block or head 11 are connected to a common manifold pipe 43. The manifolds 42 and 43 are connected to a common supply pipe 44 leading from a pressure tank 40, and a part of this pipe can include a flexible hose section to allow desired movement of the upper block or head 11. Flow of air through the pipe 44 can be controlled by any preferred type of valve 45.

The exhaust ports 32 for the upper and lower blocks can be connected to manifold pipes 46, and these manifold pipes, in turn, can be connected to a common outlet pipe 47. This pipe can be provided with a shut-off valve 48, and a part thereof can include a flexible hose section to allow desired movement of the upper block or head 11.

After the upper and lower grooves have been formed in the stone, and if the stone is not already split by this operation, the pneumatic means is cut off, and the chisels are then forcibly urged into contact with the opposite faces of the stone by any desired means, which, for the purpose of illustration, can be considered as a hydraulic means in the present instance.

Thus, each bore has also mounted therein a hydraulically operated piston 34, and the extreme inner end of each bore has communicating therewith an inlet 35 for the liquid under pressure. Obviously, when the liquid is admitted into the bores, the hydraulic pistons 34 will be forced towards the stone and urged into continuous pressure with the chisels, which are, in turn, urged into continuous pressure with the stone. If the stone is relatively thin, or of a soft nature, the same will be split along the grooves. If, however, the stone is hard, then I provide additional means for splitting the stone, as will be described later.

All of the inlets 35 can communicate with a common source of liquid under pressure, and thus the same can be easily controlled simultaneously to all pistons.

For the purpose of illustration, I have shown the ports 35 in the lower block 9 connected to a common manifold pipe 50, and all of the ports 35 in the upper block 11 to a common manifold pipe 51. The manifolds 50 and 51 are connected to a common pipe 52, which leads to a supply pipe 53 and a return pipe 54. This pipe 52, at necessary points, can have incorporated therein flexible hose sections, as shown, to allow the desired movement of the head or block 11. The return pipe 54 leads to a storage tank 55 for fluid, and the supply pipe 53 leads from a pump 56 of any preferred character. The inlet of the pump is connected with the tank 55 by means of a pipe 57. The liquid is supplied under pressure from the pump 56 to the pipe 52, and a two-way valve 58 is provided for controlling the flow of fluid to the pipe 52. The valve can be turned so as to cut off the supply of fluid from the pump 56 to the pipe 52, and to connect the pipe 52 with the return pipe 54. This will relieve the pressure.

When all of the chisels are held firmly against the stone, and the same is of such a nature that it will not split, then the drop-hammer 15 is released, and the same hitting the upper block 11 will create a sharp sudden blow on the stone, and this will bring about the instant cracking of the stone along the grooves. As stated, the hammer can be operated in any preferred manner, or by any desired means.

With the employance of my device, the cracking of the stone in different directions is prevented, in that the formation initially of the upper and lower grooves permits the stone to split along the lines of the grooves. The drag on the hydraulic cushioned pistons will prevent the stone from splitting in unintended directions. This action is comparable to the use of

wooden or rubber mallets by stone carvers, as they have found that where split mallets or hammers are used the stone will break in unintended directions. Also, as chisels are used to make the grooves, the stone, when split, does not show any mechanical or sawed edges. Thus, the stone takes on the appearance of hand-trimmed stone, which is desirable in most building structures.

In use of my improved device, the head or upper block 11 is raised, and the stone is slid between the blocks, after which the head or upper block 11 is released. The chisels are now reciprocated independently of each other, as heretofore described, and after the grooves have been made to the desired depth, the reciprocation or vibration of the chisels is stopped, and continuous pressure is then applied thereto. When the chisels are firmly held against the stone, the drop-hammer 15 is released so that the desired sudden heavy blow can be imparted to the stone.

When the pistons 34 are against the pistons 29 the same are returned to their normal positions by the releasing of hydraulic pressure against the pistons 34, and by admitting the compressed air to the cylinders the compressed air forces the hydraulically operated pistons 34 to the ends of their cylinders, and these pistons 34 are held by the air against the inner walls of the cylinders.

Any preferred means can be utilized for raising and lowering the head or upper block 11, and for the purpose of illustration the upper block has connected thereto a pull rope or cable 36, which is trained about an upper pulley 37. The cable can then lead to any desired mechanism, such as a winding drum or windlass.

From the foregoing description it can be seen that I have provided a novel rock or stone splitting machine, in which all of the operating parts are self-contained; that is, the machine itself forms the grooves in the stone and then the stone is split. In other words, after the stone is placed between the anvil and head, the same is not removed until the splitting action takes place.

It is to be understood that I have only shown one form of my proposed machine, and that various changes can be made thereto, providing such changes are within the scope of the appended claims.

What I claim as new is:

1. A stone cutting and splitting device comprising, an anvil, a head movable toward said anvil, the head and anvil being adapted to receive stone therebetween of variable thickness, means for forming a groove in the stone including a plurality of independently movable chisels carried by at least one of the mentioned members, means for vibrating the chisels, means independent of said vibration means for creating steady pressure on the chisels to hold the chisels against the stone when said vibration means is not employed, and means for imparting sudden cushioned shock to the head.

2. A machine for cutting and splitting stone comprising, a stationary anvil, a head movable toward and away from said anvil, the anvil and head being adapted to receive stone therebetween, a plurality of independently movable chisels carried by the anvil and head, means for vibrating the chisels against the stone, means for holding the chisels with pressure against said stone when the means for vibrating the chisels is not in operation, and means for imparting a sudden blow to the stone including a weight mounted above the head.

3. A machine for cutting and splitting stone comprising, a stationary anvil, a head movable toward and away from said anvil, the anvil and head being adapted to receive stone therebetween, a plurality of independently movable chisels carried by the anvil and head, means for vibrating the chisels against the stone, means for holding the chisels with pressure against said stone when the means for vibrating the chisels is not in operation, means for imparting a sudden blow to the stone including a weight mounted above the head, and means for elevating the weight.

4. A machine for cutting and splitting stone comprising, a stationary anvil, a head movable toward and away from said anvil, the anvil and head being adapted to receive stone therebetween, a plurality of independently movable chisels carried by the anvil and head, means for vibrating the chisels against the stone, means for holding the chisels with pressure against said stone when the means for vibrating the chisels is not in operation, means for imparting a sudden blow to the stone including a weight mounted above the head, means for elevating the weight, and means for releasing the weight after the same has been elevated.

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