Aug. 13, 1963 W. F. STEFANICK 3,100,481

STONE CUTTER

Filed Aug. 8, 1960 4 Sheets-Sheet 1

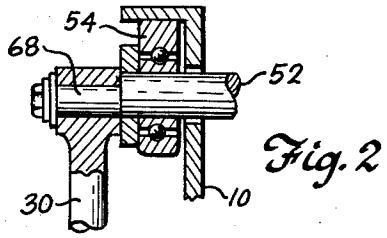


Fig. 2

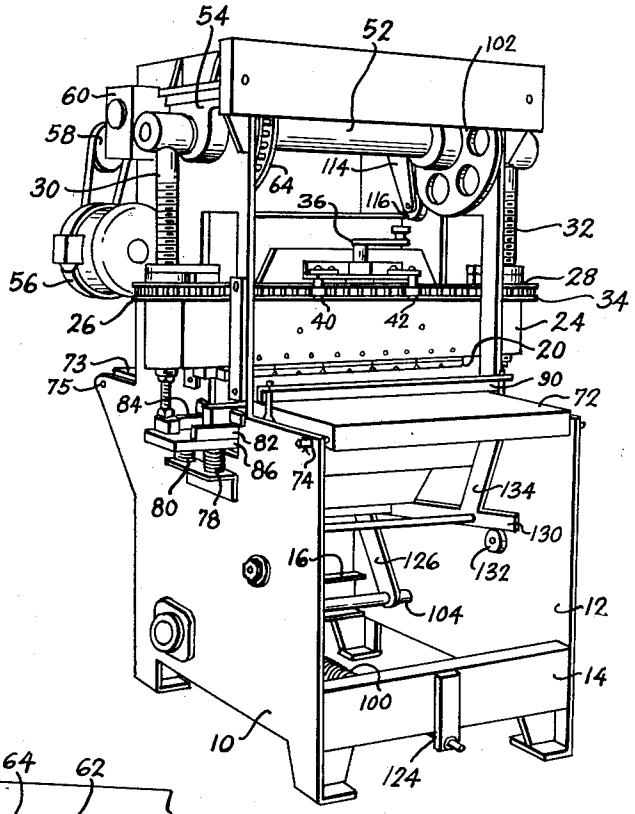


Fig. 1

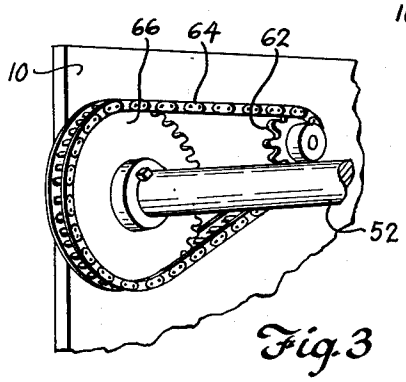


Fig. 3

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STONE CUTTER

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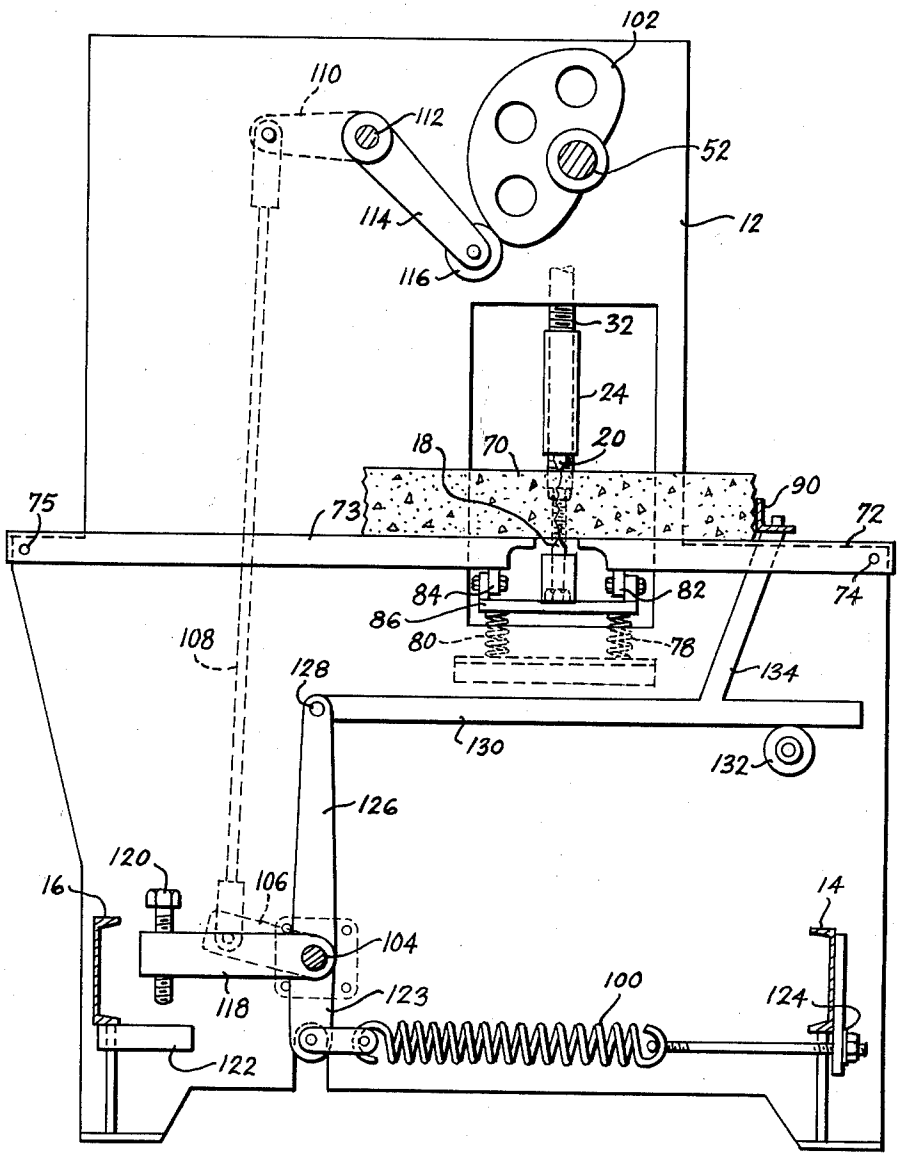


Fig. 4

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STONE CUTTER

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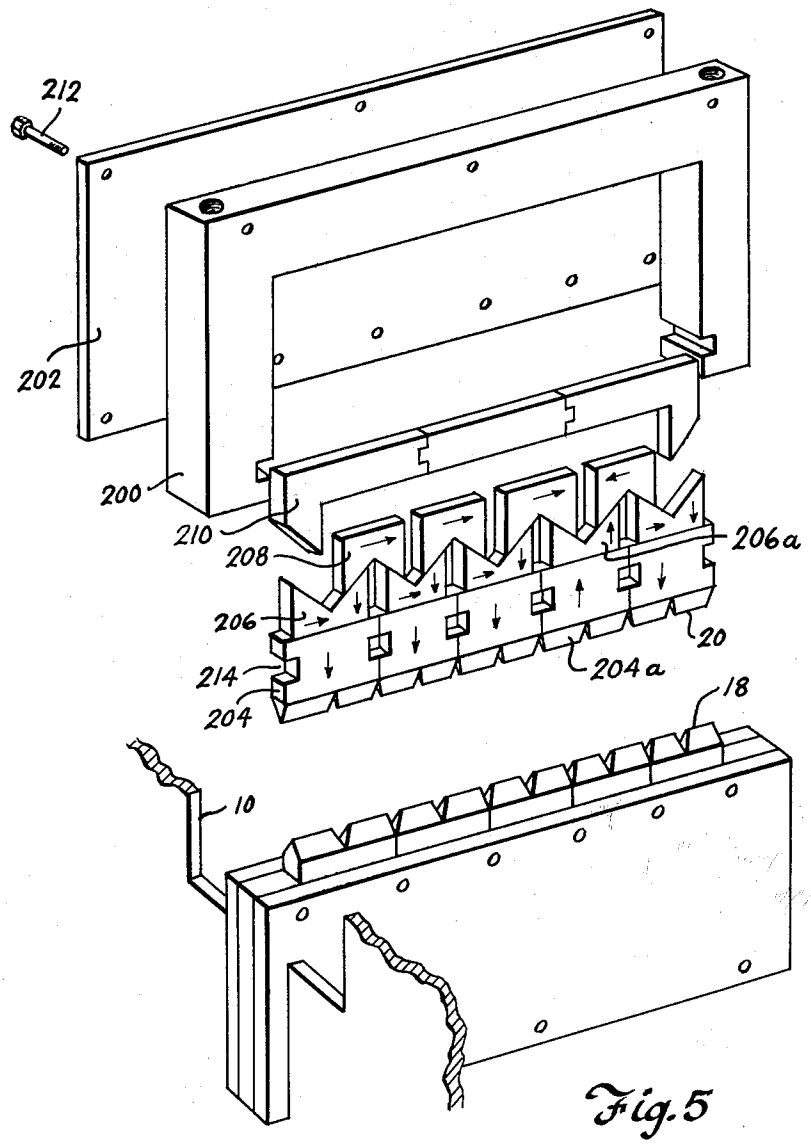


Fig. 5

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STONE CUTTER

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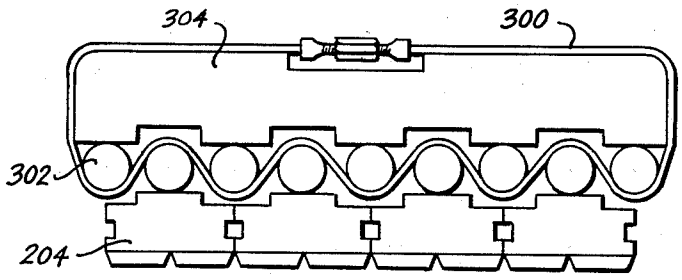


Fig. 6

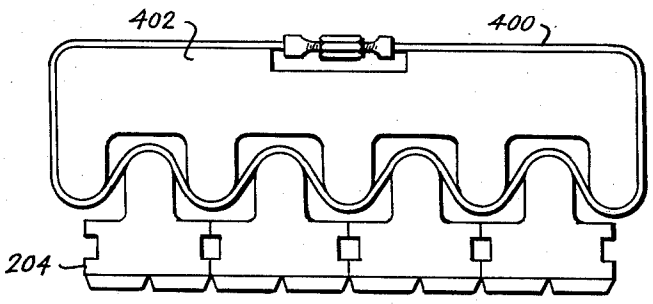


Fig. 7

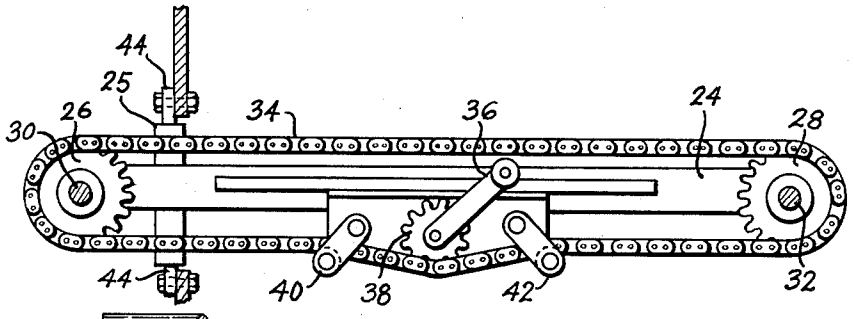


Fig. 8

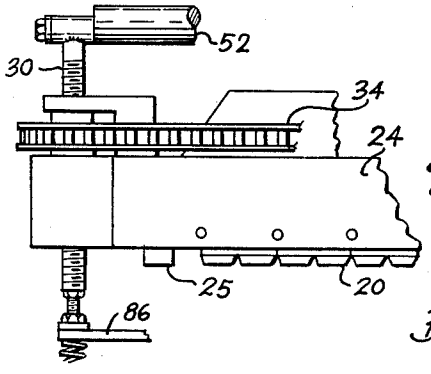


Fig. 9

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3,100,481

STONE CUTTER

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Filed Aug. 8, 1960, Ser. No. 48,046
4 Claims. (Cl. 125—23)

This invention relates to a machine for splitting stone and the like in slab form. By the term stone, I intend to include all hard substances in slab form such as, concrete, hard plastic compositions, etc.

It is well known that stone can be efficiently split between a pair of chisel-like splitting blades and a variety of machines for doing this are available. A common type of machine has a pair of splitting blades mounted within a rigid frame and a feed table by which the stone can be fed to the blades for splitting. The feed table is commonly spring urged to a position above the lower rigid splitting blade and is depressed against the spring pressure by the dropping upper splitting blade.

The spring pressure must, of course, be great enough to hold the slab of stone above the lower splitting blade as the stone is fed to the machine and in order that the machine is able to handle heavy stone pieces, a considerable spring strength is necessary. It will be apparent that as the upper splitting blade falls on the stone it first engages with the stone to depress the table and later the stone engages with the lower splitting blade. In some cases, especially with lighter pieces of stone, considerable pressure is exerted against the upper surface of the stone by the upper splitting blade before the table is depressed sufficiently for the stone to engage with the lower splitting blade and some splitting action takes place before the lower splitting blade is engaged by the stone. This results is an uneven split. It is very much more desirable from the point of view of quality of the split in the stone to have the stone between both splitting blades at the time splitting pressure is initially exerted. This result is achieved with this invention.

I provide a spring loaded feed table for advancing the stone between the blades, the forward edge of which is normally above the level of the lower blade to permit even feeding of the stone between the blades prior to cutting. As the upper splitting blade is dropped, however, I provide means for lowering the feed table to a level below the lower splitting blade before the upper splitting blade contacts the stone. Thus, from the beginning of the splitting operation both the upper and lower splitting blades engage with the stone.

In addition, according to this invention, the means for reciprocating the upper splitting blade is mounted above the upper splitting blades so that it is remote from the dust and grit created by the splitting operation. In this way, I am able to keep the running parts of the machine more free from the abrasive affects of the dust from the cut stone.

I also have in my machine a means for exerting an even splitting pressure on an undulating slab surface.

This invention will be clearly understood after reference to the following detailed specification read in conjunction with the drawings.

In the drawings,

FIGURE 1 is a perspective view of a stone splitting machine according to this invention.

FIGURE 2 is a detailed sectional view showing a crank for reciprocating the upper blade housing.

FIGURE 3 is a view showing the manner in which the main drive shaft is driven from the output of the gear reduction box.

FIGURE 4 is a side sectional view illustrating the means for advancing stone between the blades.

FIGURE 5 is a partial view showing the lower blade housing and certain parts of the upper blade housing in exploded form.

FIGURE 6 illustrates an alternative blade arrangement to that shown in FIGURE 5.

FIGURE 7 illustrates a still further blade arrangement.

FIGURE 8 is a top view of the chain for adjusting the upper blade assembly and

FIGURE 9 is an elevation of one end of the upper blade assembly.

Referring to the drawings, the stone cutter there illustrated comprises a frame formed by two steel side members **10** and **12** rigidly spaced apart by cross members such as the members **14** and **16**. Cross support also comes from other transversely extending supports not shown and/or specifically referred to.

The lower and upper splitting blades **18** and **20** respectively are mounted within lower and upper splitting blade housings **22** and **24** respectively. The housing **22** sits rigidly within a cut-out in the side members **10** and **12** of the frame. The housing **24**, however, is reciprocably mounted within the frame as will be referred to in more detail later.

The housing **24** for the upper splitting blade **20** is suspended on crank rods **30** and **32** at each side of the machine. The crank rods **30** and **32** each threadedly engage with a sprocket **26** and **28** respectively, housed within a jaw on the upper side at each end of the housing **24**. Crank rods **30** and **32** freely pass through the housing **24** as illustrated in the drawings. A chain **34** operable by the hand crank **36** and associated sprocket **38** is adapted to rotate sprockets **26** and **28** in either direction at will, whereby one can wind the housing for the upper splitting edge upwardly or downwardly of the threaded crank rods **30** and **32**. Numerals **40** and **42** are idlers carried by the housing **24** for the purpose of taking up slack in the drive chain **34**. It is by means of crank **36**, as will be explained later that one can accommodate stone or the like of varying thicknesses.

As best seen in FIGURE 8 of the drawings, the housing **24** for the upper splitting blade has bearing blocks **25** that engage with guide bars **44** as it is reciprocated in a vertical direction in use.

The reciprocation of the splitting edge housing **24** is effected by the rotation of crankshaft **52** which is suitably rotatably mounted with respect to the sides **10** and **12** of the machine in roller bearings such as the one **54** on the side **10** of the machine. The roller bearing similar to the one **54** is provided on the side **12** of the machine but not illustrated in the drawings.

Crank **52** is driven by means of motor **56** mounted on the side of the frame through pulley **58** and gear reduction box **60**, the output of which is taken from the gear **62** and transmitted to the shaft **52** through chain **64** and sprocket **66**, sprocket **66** of course being rigidly connected to the shaft **52**. A stub shaft extends from each eand of the crank shaft **52**. These stub shafts are aligned and the one on the left hand side of the machine has been illustrated in detail in FIGURE 2 and is referred to by the numeral **68**. The crank rod **30** is journalled to the stub shaft **68** as indicated in FIGURE 2 and it will be apparent that as the stub shaft **68** is carried in a circular path by the rotation of the crank shaft **52** crank rod **30** will be reciprocated.

As indicated above, there is an eccentric stub crank shaft similar to the one **68** on the opposite side of the machine and this shaft is similarly connected to crank rod **32**. Thus, crank rod **32** is reciprocated by the rotation of stub crank shaft **52** simultaneously with crank rod **30** and as the two crank rods reciprocate the housing **24** for the upper splitting edge is carried in a vertical

up and down movement between the guides in the sides of the machine.

A stone slab to be cut, referred to by the numeral 70, is fed to the cutters on feedtable 72. A delivery table 73 is provided on the back side of the cutters. Both the feed and delivery tables are swingably mounted in the frame as at 74 and 75 respectively and their edges which are adjacent the splitting blades are supported at each side of the machine on springs 78 and 80 respectively. In this connection the supported edge of the tables has a bar 82 and 84 respectively extending entirely there across that protrudes beyond the side of the frame of the machine as seen in FIGURE 1. The free ends of these bars are joined by means of a flanged plate 86 and the plate is in turn supported by the springs 78 and 80. It will be appreciated that the support is the same at each side of the machine although it is illustrated only at the left hand side as viewed in FIGURE 1.

The feed and delivery tables are normally supported by means of the springs 78 and 80 so that their edges that are in close proximity to the blade are normally above the level of the bottom blade 18 and the strength of the springs 78 and 80 is such that when one places a slab of stone or the like on the tables between the blades the tables will not depress due to the weight of the stone to cause the stone to sit on the lower blade.

In use, the tables are deflected downwardly against the resilience of the springs but, according to this invention, the downward deflection of the tables takes place before the upper blade engages with the stone, whereby not even initial splitting can take place until both blades engage with the stone. This achieves an even split.

The dropping of the tables prior to the taking place of the splitting action is achieved by the engagement of the extending free ends of the crank rods 30 and 32 at each side of the machine with the plates 86 before the upper cutting blade engages with a slab of stone.

It will be recalled that the assembly 24 within which the upper splitting edge 20 is mounted can be raised or lowered with respect to the crank rods 30 and 32 by manually operating the crank 36. Thus, there is a height at which the upper blade assembly can be adjusted for each thickness of stone such that the lower ends of the rods 30 and 32 will engage with and depress the plates 86 to carry the table below the edge of the lower blade before the upper blade engages with the stone.

The machine illustrated in commonly used to split pieces of stone into two equal parts and in this respect, there is illustrated an automatic means for advancing the stone the proper distance into the splitters.

The means for advancing a slab of stone comprises a bar 90 that moves a predetermined distance under the force of a tensioned spring 100 in response to the movement of a cam 102 on the driveshaft 52.

The movement centres around the shaft 104 which extends transversely across the machine and is journalled between the sides 10 and 12 thereof. Rigidly connected to the shaft is a link 106 that pivotally connects at one end with a rod 108. Rod 108 extends upwardly to pivotally connect with a link 110 which in turn is rigidly connected to a shaft 112 that extends across the machine and is journaled between the sides 10 and 12 thereof in a suitable fashion. Also extending from the shaft 112 is a link 114 which has a cam follower 116 at its free end for engagement with the cam 102.

A stopper arm 118 is also rigidly mounted on the transversely extending shaft 104. It has an adjustable screw 120 therein that in use is adapted to engage with the stopper block 122. Screw 120 can be threaded inwardly or outwardly of the free end of the stopper arm 118.

A link 123 also extends downwardly from the shaft 104 and pivotally connects at its free end with a connector at the end of tension spring 100. The opposite end of tension spring 100 is secured to a stop at the front of the machine as at 124.

A connection between the shaft 104 and the feed-bar 90 is achieved through a pair of links 126, one on each side of the machine, that each pivotally connect as at 128 with a support bar 130 that is free to slide in a horizontal direction on a roller 132. Extending upwardly from the support bars 130 at each side of the machine is an arm 134 to the free end of which is mounted the bar 90. The arms 134 extend upwardly between the sides 10 and 12 of the machine and the feed-table 72.

The tension on the spring 100 tends to urge the cam follower 116 into contact with the cam 102 and in use as the cam 102 turns from the position indicated in FIGURE 4 to cause the flat side thereof to engage with the cam follower. The bar 90 moves forward under the action of the spring 100 and is limited in this forward movement by the engagement of the free end of the screw 120 against the stop 122. The cam 102 is located on the shaft 52 such that the forward movement takes place when the splitting blade 20 is in a raised position. It will be apparent that the amount of forward travel of the bar 90 can be adjusted by varying the extension of the screw 120 through the stop-arm 118. As the rounded portion of the cam 102 cyclically engages the cam follower 116, the bar 90 is retracted to its rear limit. It will be apparent from an examination of the cam that the feed motion of the bar 90 occurs once between each dropping of the splitting edge 20.

This machine has a blade that is made in sections so that the splitting edges will adjust themselves to the contour of an uneven slab of stone within limits. One means by which I achieve this adjustment is illustrated in FIGURE 5 of the drawings which shows a lower splitting blade assembly and a part of the upper cutting blade assembly exploded to show construction.

The assembly comprises a frame 200 which has a back plate 202 and a front plate similar to the back plate but not shown. A series of splitting blade segments 204, a series of lower wedge links 206, a series of upper wedge links 208, and a segmental compression bar 210 are retained within the frame between the two plates by means of bolts 212 that pass through the plates and the frame to secure them together, and through the plates and openings 214 in the sides of the blade segments. The bolts are of small diameter so that the blade sections are free to move vertically with respect to them between the plates.

The levelling operation of the composite blade is as follows: Suppose the blade were to be dropped on a piece of stone that had a high spot where the segment 204*a* struck. This segment 204*a* would be forced in an upward direction and would carry the lower link 206*a* upwardly. As it did so, the upper links, which rest on the compression bar 210, to the left and to the right of link 206*a* tend to be drawn towards link 206*a* as shown by the direction of the arrows. The end links of the series 206 would tend to force themselves against the wedge surfaces of the compression bar 210. This bar, however, is rigid against compression with the result that the lower links 206 on each side of link 206*a* are forced in a downward direction whereby to lower the blade sections to the right and to the left of the blade section 204*a* to follow the contour of the piece of stone being split.

Alternative methods to the link arrangement illustrated in FIGURE 5 are shown in FIGURES 6 and 7. In FIGURE 6, I illustrate a chain 300 that extends around steel balls 302 and a compression bar 304 which is the equivalent of the bar 210. The blades are again illustrated by the numeral 204 and are held in the assembly and align themselves with a surface in a similar way.

A similar effect is achieved with the arrangement illustrated in FIGURE 11 in which the tension chain 400 extends around the points of the compression bar 402.

Other embodiments of the invention will be apparent to those skilled in the art.

What I claim as my invention is:

1. In a device for splitting stone a frame, a lower splitting blade housing, a lower splitting blade in said lower splitting blade housing, an upper splitting blade housing, an upper splitting blade in said upper splitting blade housing, said lower splitting blade housing being mounted in said frame, means for reciprocating said upper splitting blade housing within said frame to carry said upper splitting blade into splitting co-operation with said lower splitting blade, a feed table for advancing stone between said blades, said feed table having a forward edge in close parallel relationship to said lower splitting blade, said feed table being movable in said frame between a first normal position in which at least the forward edges thereof are at a higher level than said lower blade to a second position in which the forward edge of said feed table is lower than said lower blade, and means responsive to the reciprocation of said upper blade housing as said upper blade housing is moved toward said lower blade for lowering said feed table from said first position to said second position to permit a piece of stone to engage with said lower blade prior to engagement therewith of said movable blade in use, said feed table being spring urged to said first position, and said means for cyclically lowering said table from said first position to said second position being carried by said upper splitting blade housing.

2. A device for splitting stone as claimed in claim 1 in which said feed table is hinged in said frame adjacent its rearward edge.

3. A device for splitting stone as claimed in claim 1 having a delivery table on the opposite side of said lower splitting blade to said feed table, said delivery table being movably mounted within said frame and having an edge in close parallel relationship to said lower blade, said delivery table being movable in said frame between a first normal position in which the edge thereof that is adjacent said lower blade is at a higher level than said rigid blade to a second position

in which said edge is lower than said rigid blade, said delivery table being adapted to move between said two positions as said feed table moves between its said two positions.

4. In a device for splitting stone a frame, a lower splitting blade housing, a lower splitting blade in said lower splitting blade housing, an upper splitting blade housing, an upper splitting blade in said upper splitting blade housing, said lower splitting blade housing being mounted in said frame, means for reciprocating said upper splitting blade housing within said frame to carry said upper splitting blade into splitting co-operation with said lower splitting blade, a feed table for advancing stone between said blades, said feed table having a forward edge in close parallel relationship to said lower splitting blade, said feed table being movable in said frame between a first normal position in which at least the forward edges thereof are at a higher level than said lower blade to a second position in which the forward edge of said feed table is lower than said lower blade, and means responsive to the reciprocation of said upper blade housing as said upper blade housing is moved toward said lower blade for lowering said feed table from said first position to said second position to permit a piece of stone to engage with said lower blade prior to engagement therewith of said movable blade in use, said means for cyclically reciprocating said upper blade housing being mounted above the level of the said upper blade, and including a crank, means for turning said crank, a crank rod depending from said crank, said crank rod connecting with said upper blade housing.

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