

Feb. 24, 1959

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2,874,688

MASONRY CUTTERS

Filed Jan. 22, 1957

3 Sheets-Sheet 1

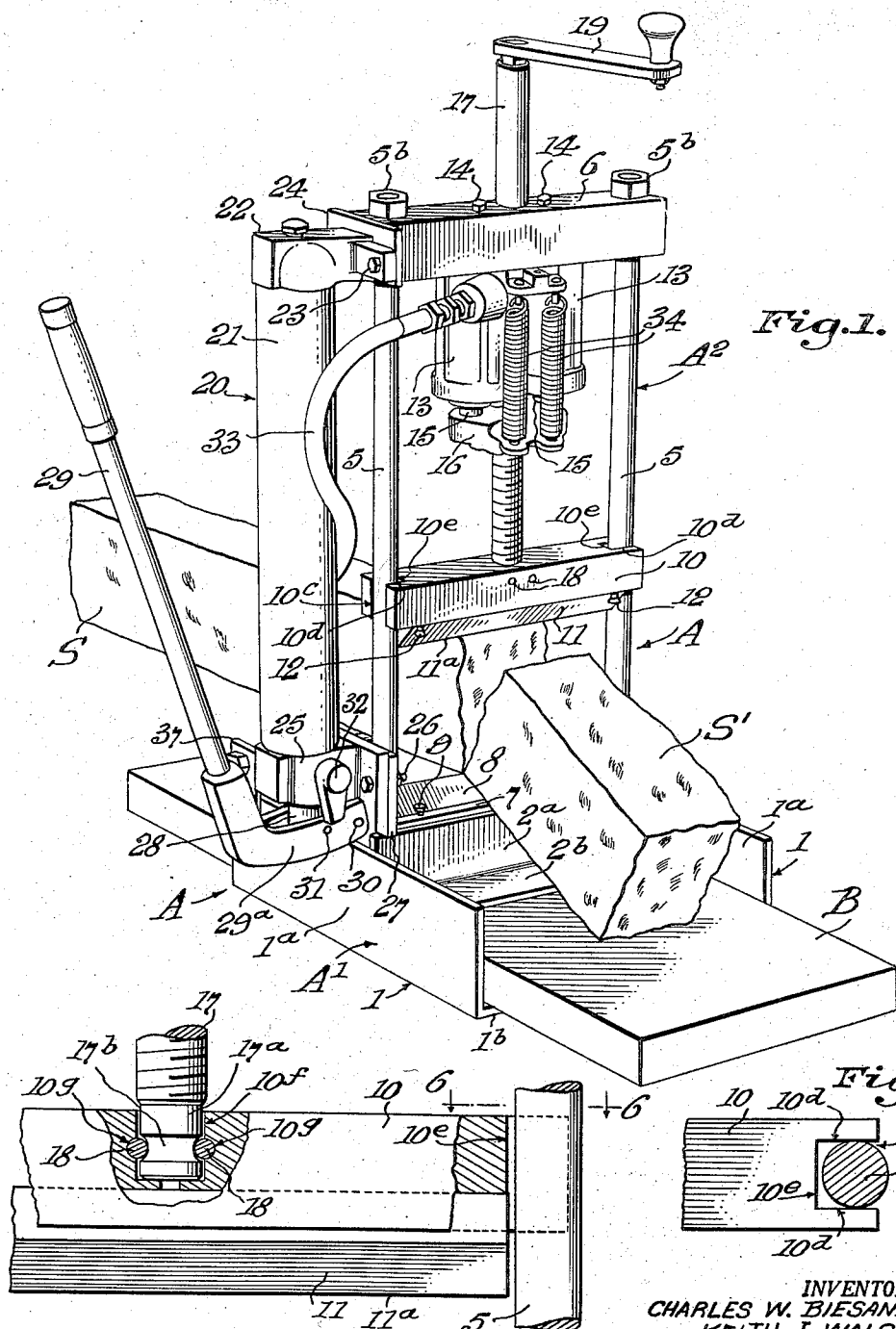


Fig. 5.

Fig. 6.

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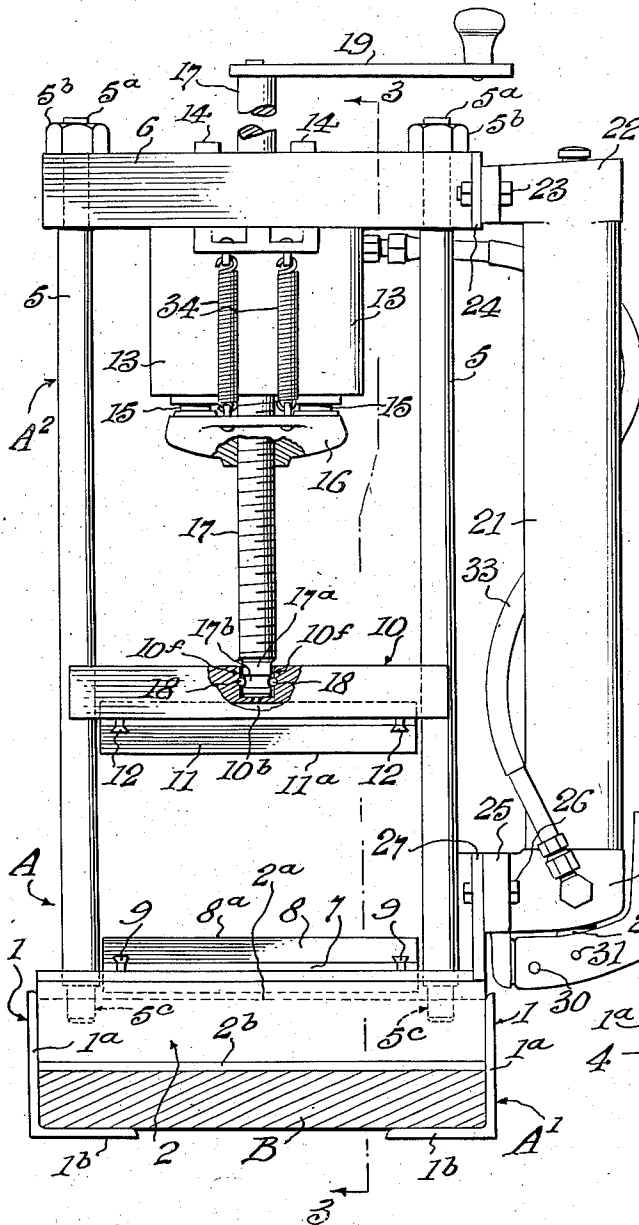


Fig. 2.

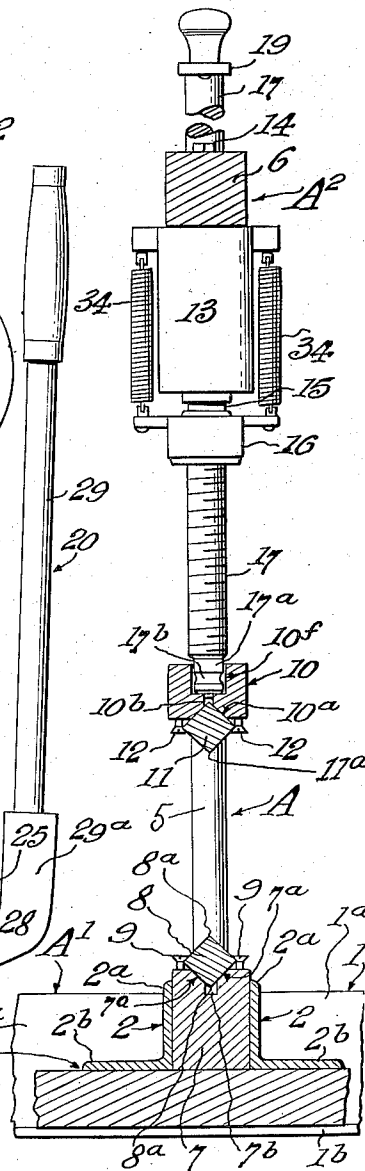


Fig. 3.

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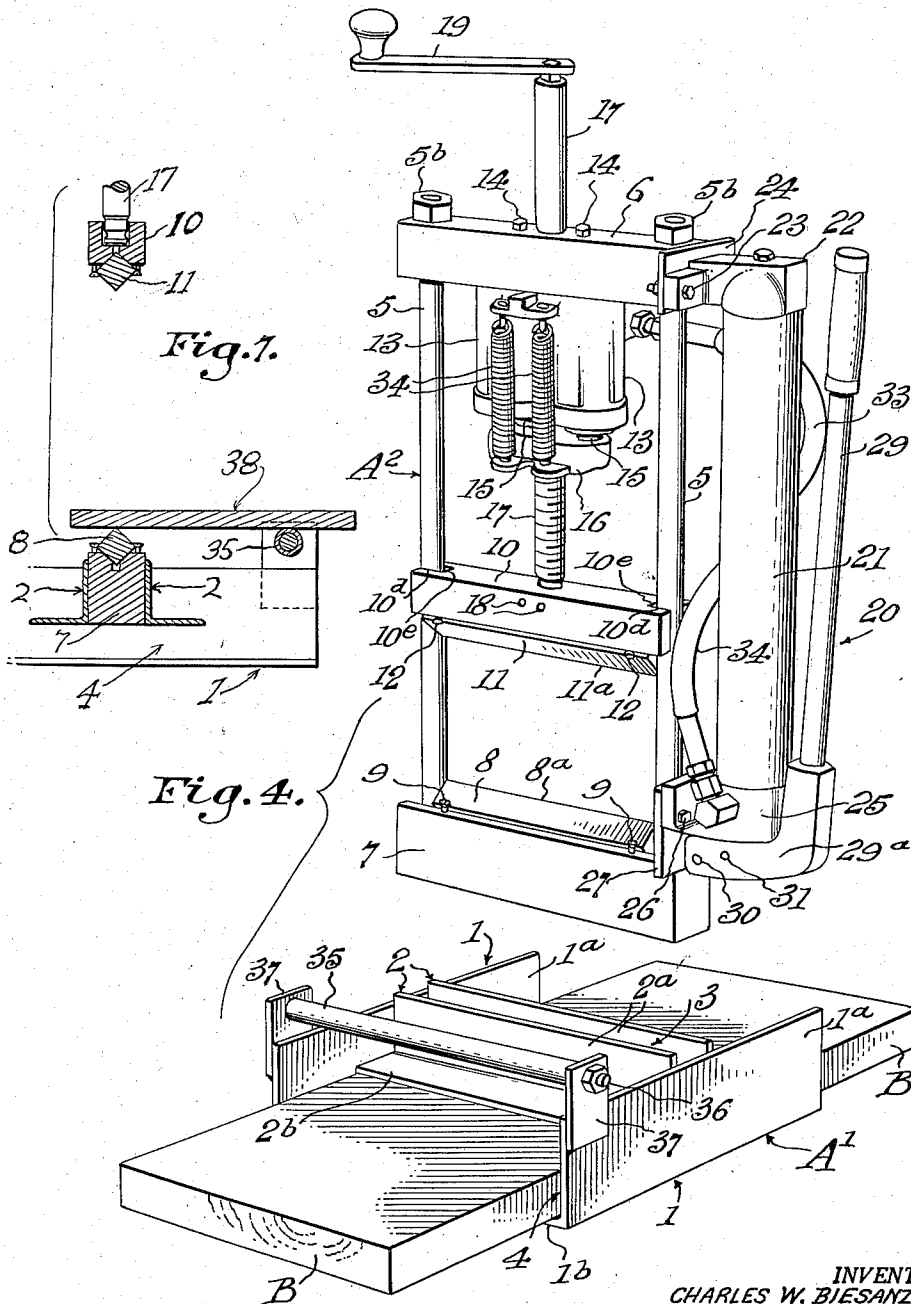
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MASONRY CUTTERS

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Application January 22, 1957, Serial No. 635,360

6 Claims. (Cl. 125—23)

This invention relates to masonry cutters, and more particularly to apparatus for cutting slabs or pieces of masonry material by the application of force on opposite sides thereof by opposed splitting knives, or in some cases by supporting a slab or piece on a base or platform and applying force on a single knife toward the base or platform.

An object of the invention is to provide apparatus of the class referred to which is of improved construction, having advantages over previously known constructions, particularly from the standpoints of efficient cutting operation, simplicity, and adaptability to lightness of structure and easy portability.

Another object of the invention is to provide a masonry cutter of the character stated including hydraulically actuated means for operating a movable knife, all of the parts which move in the making of a cut being located above the top or movable cutting knife so as not to be subject to being damaged by falling material.

Another object of the invention is to provide a masonry cutter so constructed as easily to be disassembled in part, to facilitate being moved from one job location to another.

A further object of the invention is to provide a masonry cutter including a base of novel construction adapted removably to receive a base extension member, such as a board, plank or the like.

Other objects of the invention will become apparent from a reading of the following description of a preferred embodiment, the appended claims, and the accompanying drawings, in which:

Figure 1 is a perspective view of a masonry cutter constructed in accordance with the invention, shown with the parts in the positions occupied just after the cutting of a slab;

Figure 2 is an end elevational view of the construction shown in Figure 1, with a movable knife carrier being shown partially in section;

Figure 3 is a vertical section on the line 3—3 of Figure 2;

Figure 4 is a perspective view showing an upper frame structure and associated parts in separated relation to a lower frame structure or base;

Figure 5 is a fragmentary view of a movable knife carrier and associated parts, drawn on an enlarged scale and with parts shown in section;

Figure 6 is a fragmentary horizontal section on the line 6—6 of Figure 5; and

Figure 7 is a fragmentary vertical sectional view illustrating the positioning of the parts when using only a single knife for cutting a small edge part from a slab of soft material.

In its general nature, the illustrative embodiment of the invention includes a frame generally designated A comprising two separable frame sections, one being a base A¹ and the other a frame superstructure A² adapted to be removably mounted upon the base A¹.

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The base A¹ is constructed to provide a horizontally extending opening, closed at its top and bottom and sides, and being open at its ends so as to be adapted to receive a base extension member B which may, for example, be constituted by an ordinary board or plank. In the form shown, the base A¹ is fabricated from two angle section side members 1—1 and a cross structure comprising two angle members 2—2 welded or otherwise fixed to the side members 1—1. The side members 1—1 have vertically extending webs 1^a—1^a and inwardly extending webs 1^b—1^b which serve as bottom side edge members for the base. The two transversely extending angle members 2—2 include vertical webs 2^a—2^a spaced from each other in the direction of extent of the side members 1—1 to provide an open top socket 3 adapted to receive and removably mount the lower end of the frame superstructure A². The horizontal webs 2^b—2^b of the cross members 2—2 are spaced above the inwardly extending bottom webs 1^b—1^b of the side members 1—1 so that the bottom webs 1^b—1^b and the side webs 1^a—1^a of the side members 1—1, and the horizontal bottom flanges 2^b—2^b of the transverse members 2—2 delineate an opening 4 which is rectangular in vertical section and which is open at its ends so as to permit endwise insertion of the extension member B in order to provide increased effective base length or coverage.

The upper frame A¹ includes two vertical guide members or posts, such as round rods 5—5, the upper ends 5^a—5^a of which are of reduced diameter and are threaded for extension through openings in a top frame cross member 6 perpendicular to the posts 5—5, nuts 5^b—5^b being screwed onto the threaded upper ends 5^a—5^a of the side posts 5—5 for securing the latter and the cross member 6 together. The lower ends of the side posts 5—5 are reduced in diameter and are threaded at 5^c—5^c and screwed into a lower cross member 7, shown as being formed of a solid bar. The cross member 7 is of a size to fit snugly but easily into the socket 3 for supporting the frame superstructure A² on the base A¹.

The cross member 7 serves as a support for detachably receiving a bottom knife. The support 7 is formed with a longitudinally extending V-shaped seat 7^a having two sides diverging from each other at right angles as shown in Figure 3. Mounted on the seat 7^a is a bottom knife bar 8 which is rectangular in cross section, having four longitudinally extending sharpened edges 8^a. The bar may be positioned selectively in any one of four positions angularly with respect to its longitudinal axis so as to position any one of the edges 8^a to face upwardly. In order to assure face-to-face contact of the two lowermost faces of the knife 8 with the two sides of the seat 7^a, and thus to prevent damaging the knife, the knife support 7 may be formed with a relief groove 7^b extending horizontally at the root of the seat 7^a for freely receiving the lowermost edge of the knife 8. Tapered head screws 9, threaded into the knife support 7 on opposite sides of and at the opposite ends of the support 7, are screwed into the latter to bring their tapered lower head surfaces against the upwardly and inwardly inclined sides of the knife 8 for securing the latter in its seat 7^a.

An upper knife carrier member 10, mounted on and guided for vertical movements by the side posts 5—5, is formed on its bottom with a seat 10^a and relief groove 10^b for receiving an upper knife bar 11 formed similarly to the lower knife bar 8 and being held in its seat 10^a by screws 12 to extend parallel to the lower knife 8. The ends of the movable knife carrier 10 are formed with openings or notches 10^c—10^c through which the side posts 5—5 extend, the end notches having side walls 10^d—10^d snugly contacting opposite surfaces on the rods

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5—5 to prevent the knife carrier 10 from rocking and tilting about its horizontal longitudinal axis, there being sufficient working clearance between the notch walls 10^d—10^d and the posts 5—5 to enable the carrier 10 to slide freely upwardly and downwardly. The notches 10^c—10^c also have transverse walls 10^e—10^e respectively spaced inwardly from the associated posts 5—5 with sufficient clearance greater than mere sliding operating clearance to permit the carrier 10 to tilt or rock to a limited extent about a horizontal axis transverse to the longitudinal axis of the carrier 10, and thus to enable the carrier and the upper knife 11 automatically to adjust themselves to any transverse slanting of the surface of a slab to be cut.

Mechanism for driving the carrier 10 and upper knife 11 downwardly toward the lower knife 8 includes two hydraulic cylinders 13—13 secured to the upper frame cross member 6 by screws 14—14, the cylinders 13—13 being spaced from each other and having their vertical axes intersecting the longitudinal center of the knife 11 equidistantly from and on opposite sides of the end-to-end centers of the cross member 6 and the knives 8 and 11. Plungers 15—15 reciprocable respectively in the cylinders 13—13 extend downwardly from the cylinders and are secured at their lower ends to a horizontal crosshead 16, the arrangement being such that the plungers 15—15 and the crosshead 16 form a unitary structure which may be driven downwardly by introduction of fluid under pressure to the upper ends of the cylinders 13—13.

For transmitting force from the crosshead 16 to the knife carrier 10, a screw threaded rod member 17 extends from above the frame superstructure A² downwardly freely through the cross member 6, between the cylinders 13—13, and through and in threaded engagement with the crosshead 16 midway between the connections of the plungers 15—15 to the crosshead, as shown in Figure 2. The lower end of the threaded rod 17 is reduced at 17^a for being received with substantial radial clearance in an open top bore 10^f in the knife carrier 10 midway between its ends. The reduced lower end 17^a of the rod 17 is provided with a circumferential groove 17^b which tangentially receives two parallel pins 18—18 extending horizontally into holes 10^g—10^g in the knife carrier 6 on opposite sides of the rod reduced part 17^a. The radii of the pins 18—18 and the cross section of the groove 17^b are slightly different so that the knife carrier 10 may tilt slightly about a horizontal axis perpendicular to a vertical plane coincident with the knife 11, that is a horizontal axis passing through the groove 17^b and the axis of the screw 17 perpendicularly to the longitudinal axis of the knife carrier 10.

Since the plungers 15—15 may have only a relatively short vertical travel in the cylinders 13—13, it is desirable to provide for adjustment of the position of the knife carrier 10 vertically with respect to the crosshead 16 in order to condition the mechanism for cutting slabs of different heights. This adjustment may readily be accomplished by rotating the screw 17 by means of a crank 19 applied to the upper end of the screw 17. Turning of the screw 17 within the threaded opening in the crosshead 16 adjusts the effective length of the force transmitting connection by causing the lower end of the screw to project more or less below the crosshead 16 and thus positioning the knife carrier 10 relatively far below or close to the crosshead 16.

Supplying of fluid under pressure to the upper ends of the cylinders 13—13 for operating the plungers 15—15 and crosshead 16 is accomplished by a pump generally designated 20, including a barrel 21 having a top bracket 22 secured by bolts 23 to a plate 24 welded or otherwise connected to the frame cross member 6. The pump barrel 21 is provided at its lower end with a bracket 25 secured by bolts 26 to a plate 27 connected to one of the posts 5—5 and the base A¹ by welding or in any other

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suitable manner. A pump rod 28 extends downwardly from the pump cylinder or barrel 21 and is operable by a lever 29, the forked lower end 29^a of which is pivoted at 30 on the lower barrel bracket 25, a pin 31 spanning the forked lower end 29^a of the lever 29 being connected to the pump rod 28. Rocking of the lever 29 about the pivot 30 will thus reciprocate the plunger 28. The pump 20 may be conditioned for delivering fluid under pressure to the cylinders 13—13 upon operation of the lever 29 by setting a control valve device 32 in the position shown in Figure 1. Fluid placed under compression by operation of the lever 29 and plunger 28 is delivered to the upper ends of the cylinders 13—13 through a high pressure hose connection 33. The hydraulic plungers 15—15 are operable only downwardly by hydraulic pressure, and are returnable or movable upwardly by normalizing tension springs 34—34 connected between the cylinder housing and the crosshead 16. By turning the device 180 degrees from the position shown, the pump will be conditioned to permit fluid to return from the cylinders 13—13 to the pump barrel as the springs 34—34 move the crosshead 16 upwardly.

The placing of a slab S in position to be cut is facilitated by a conveyor roller 35 mounted to turn on an axle 36 supported at its opposite ends on brackets 37—37 extending upwardly from the base side members 1—1, the axle 36 being so positioned as to mount the roller 35 with its top at substantially the same level as the upwardly facing cutting edge 8^a of the lower knife 8 which assists in splitting the work piece or slab as well as acting as a work piece support.

A masonry cutter constructed as described above gives rise to many advantages in use. Masonry cutters frequently are moved about from one job location to another, sometimes even several times in a single day. Masonry cutters embodying the present invention may readily be partially disassembled for facilitating carrying by simply lifting the frame superstructure A² and its supported parts from the base A¹ and carrying the sections A¹ and A² separately to the new job location, leaving the base extension or board B behind, if desired. To prepare the apparatus for operation at the new location, a board or plank, usually available on any such location, may easily be slipped into the opening 4 in the base A¹ to provide a greater base extent and more stability. The superstructure A² may then be simply lowered into place with the bottom cross member 7 being inserted into the socket 3, whereupon the base side members 1—1 and the cross structure 2—2 will hold the superstructure against tipping, and the bottom of the superstructure will be caused by gravity to rest upon the base extension B where the latter passes under the socket 3.

The slab S of material to be cut may be rested upon the conveyor roller 35 and easily moved over the bottom knife 8 to level the slab and position it with the desired plane of cut in registration with the lower and upper knives 8 and 11. If the slab is relatively shallow, the crank 19 may be turned to rotate the threaded rod 17 and adjust the vertical position of the knife carrier 10 relative to the crosshead 16 so that when the latter is moved downwardly by operation of the pump 20 the upper knife 11 will engage the top of the slab S and form the cut before the hydraulic plungers 15—15 have been moved to the limit of their downward travel. If, in the cutting of another slab of greater height, the upper knife 11 is not sufficiently high when the crosshead 16 is fully retracted to enable the slab to be positioned between the knives 8 and 11, the crank 19 may be operated reversely to raise the knife carrier 10 relatively to the crosshead 16, thereby providing the required vertical clearance between the top of the slab and the upper knife 11.

Since the top of the conveyor 35 is positioned substantially at the same level as the operatively positioned cutting edge 8^a of the lower knife 8, the conveyor roller

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35 and lower knife 8 serve to level the slab to be cut, which is of considerable assistance in placing the slab accurately to perform the cut along the desired plane. The cut end S' of the slab S will fall only a short distance upon the board B, which being of wood or other cushioning material, provides a safeguard against breaking or spalling of the lower edge of the piece S'. Since the operating mechanism constituted by the cylinders 13—13, plungers 15—15, crosshead 16, and thrust transmitting screw 17 are all positioned above the upper cutting knife 11 and its carrier 10, there is no danger that cut or falling pieces of slab will drop upon and damage the operating parts.

When cutting or splitting a very small edge from a slab of soft material, it is sometimes advantageous to use only the upper knife 11, resting the slab to be cut or split on a work piece support provided by a flat metal plate 38 laid on the lower knife 8 and the conveyor roller 35, as shown in Figure 7.

The construction disclosed embodies the invention in its preferred form, but it is intended that the disclosure be illustrative rather than definitive. The invention is defined in the appended claims.

We claim:

1. In a masonry cutter, a frame; a work piece support on the frame; a knife; means mounting said knife on said frame substantially parallel to said support for relative movements toward and away from said support; two hydraulic cylinders mounted on said frame on opposite sides of the end-to-end center of said knife; hydraulic plungers reciprocable respectively in said cylinders; a crosshead connecting said plungers; force transmitting means connected to said crosshead midway between the connections of said plungers to said crosshead, and connected to said knife midway between its ends; and means for adjusting the effective length of said force transmitting means between said crosshead and said knife.

2. In a masonry cutter, a frame; a work piece support on the frame; a knife; means mounting said knife on said frame substantially parallel to said support for relative movements toward and away from said support; two hydraulic cylinders mounted on said frame on opposite sides of the end-to-end center of said knife; hydraulic plungers reciprocable respectively in said cylinders; a crosshead connecting said plungers; and means connecting said crosshead to said knife comprising a screw threaded rod having threaded connection with said crosshead midway between the connections of said crosshead to said plungers and being connected to said knife midway between its ends for rotation relative to said knife, the effective connecting length of said rod and the distance between said crosshead and said knife being variable by rotation of said rod with respect to said crosshead.

3. In a masonry cutter, a vertical frame; a work piece support on the frame adjacent the bottom thereof; a knife; means mounting said knife on said frame above and substantially parallel to said support for relative movements toward and away from said support; two hydraulic cylinders mounted on said frame above said knife and on opposite sides of the end-to-end center of said knife; hydraulic plungers reciprocable respectively in said cylinders; a crosshead connecting said plungers; a screw threaded rod extending vertically from above said cylinders midway between said cylinders through and in threaded connection with said crosshead; means connecting the lower end of said rod to said knife at a location midway between the ends of said knife for rotation of said screw relative to said knife; and means on said rod above said cylinders for rotating said rod to vary the distance between said crosshead and said knife.

4. In a masonry cutter, a frame comprising two spaced

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parallel vertical side posts, a horizontal lower cross member connected to the lower ends of said posts, and a horizontal upper cross member connected to the upper ends of said cross members; a lower knife mounted on said lower cross member; a horizontal knife carrier extending between said posts above said lower cross member and lower knife and being provided at its ends with notches respectively receiving said posts for relative sliding of said knife carrier on said posts, each of said notches having two side walls snugly contacting opposite faces of the associated post and a transverse wall spaced from the associated post with sufficient clearance to permit tilting of said knife carrier about a horizontal axis perpendicular to said knife carrier midway between the ends thereof; an upper knife mounted on the bottom of said knife carrier; two hydraulic cylinders mounted on said upper cross member equidistantly from and on opposite sides of the end-to-end center of said upper cross member; hydraulic plungers vertically reciprocable respectively in said cylinders and projecting downwardly toward said knife carrier; a horizontal crosshead connecting said plungers; a threaded rod extending vertically downwardly from above and through said upper cross member between said cylinders and through and having threaded connection with said crosshead midway between the ends thereof; means connecting the lower end of said rod to said knife carrier; and means on said rod above said upper cross member for rotating said rod and thereby varying the distance between said crosshead and said knife carrier.

5. In a masonry cutter, a base comprising two spaced sides, bottom edge parts extending inwardly from said sides toward each other, and two cross parts spanning the space between said sides, said cross parts being spaced above said bottom edge parts to provide an opening for receiving a base extension member by horizontal insertion of said base extension member into said opening when said base is in its normal position of use, and said cross parts being spaced horizontally from each other to provide an open top socket; a frame having a lower end part receivable in said socket whereby said frame may be removably supported on said base to extend upwardly therefrom and to be supported thereon by gravity; and cutting means mounted on said frame.

6. In a masonry cutter, a base comprising two spaced parallel side angle members each having a vertical web and an inwardly extending horizontal web, and two spaced parallel cross angle members secured at their opposite ends to the vertical webs of said side angle members, said cross angle members having horizontal webs spaced above the inwardly extending horizontal webs of said side angle members to provide an opening for receiving a base extension member by horizontal insertion thereof into said opening parallel to said side angle members when said base is in its normal position of use, and said cross angle members having spaced vertical webs providing therebetween an open top socket; a frame having a bottom end part receivable in said socket whereby said frame may be removably supported on said base to extend upwardly therefrom; and cutting means mounted on said frame.

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