H. H. MERCER.

CHANNELING MACHINE.

APPLICATION FILED NOV. 16, 1906.

1,011,221.

Patented Dec. 12, 1911.

4 SHEETS—SHEET 1.

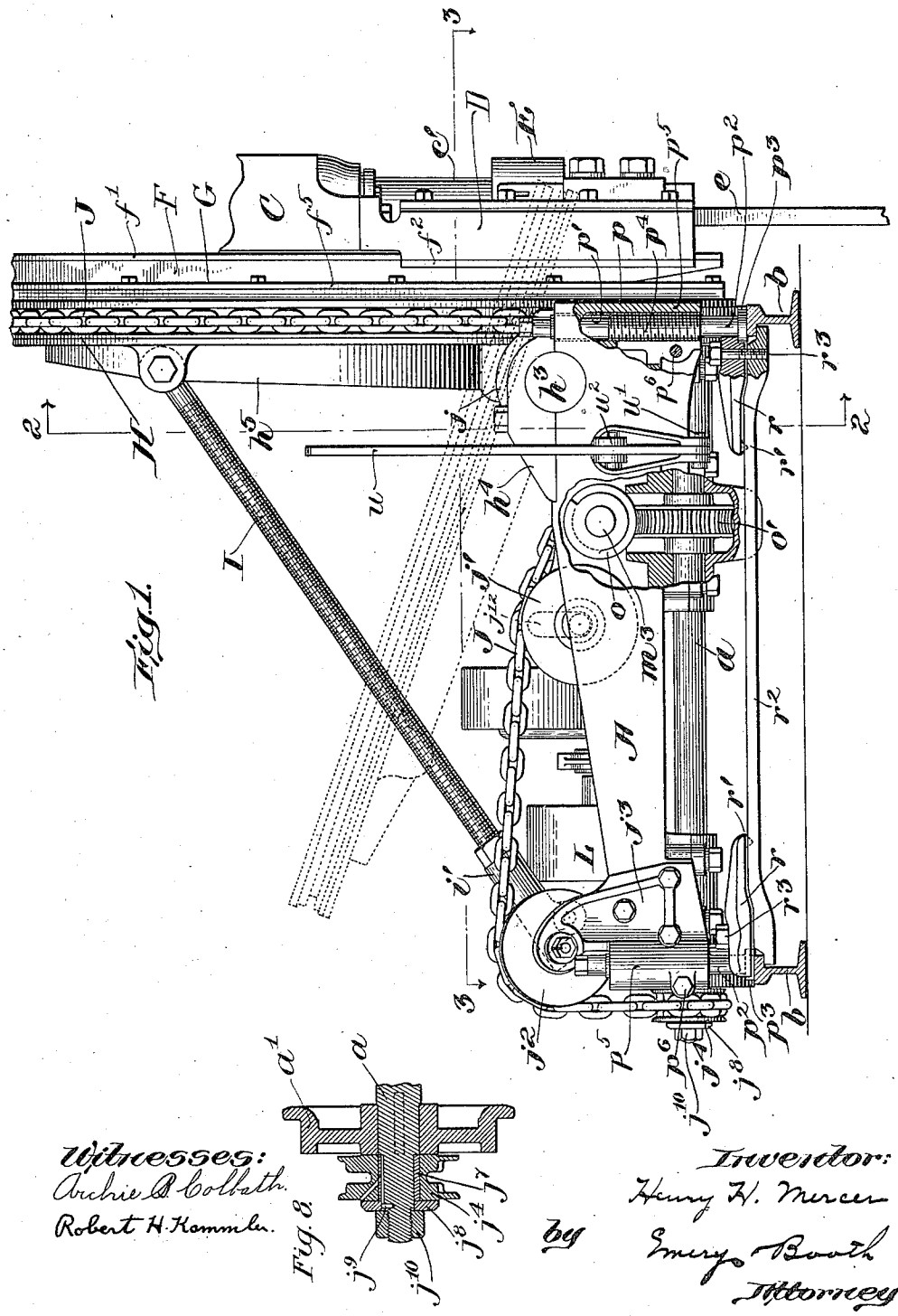

Fig. 1.

Fig. 2.

Witnesses:
Archie S. Colbath.
Robert H. Kammler.

Inventor:
Henry H. Mercer
by Emery Booth
Attorneys.

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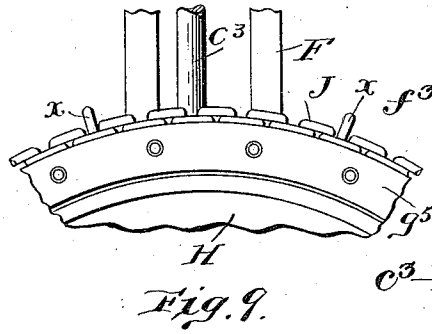

Fig. 1.

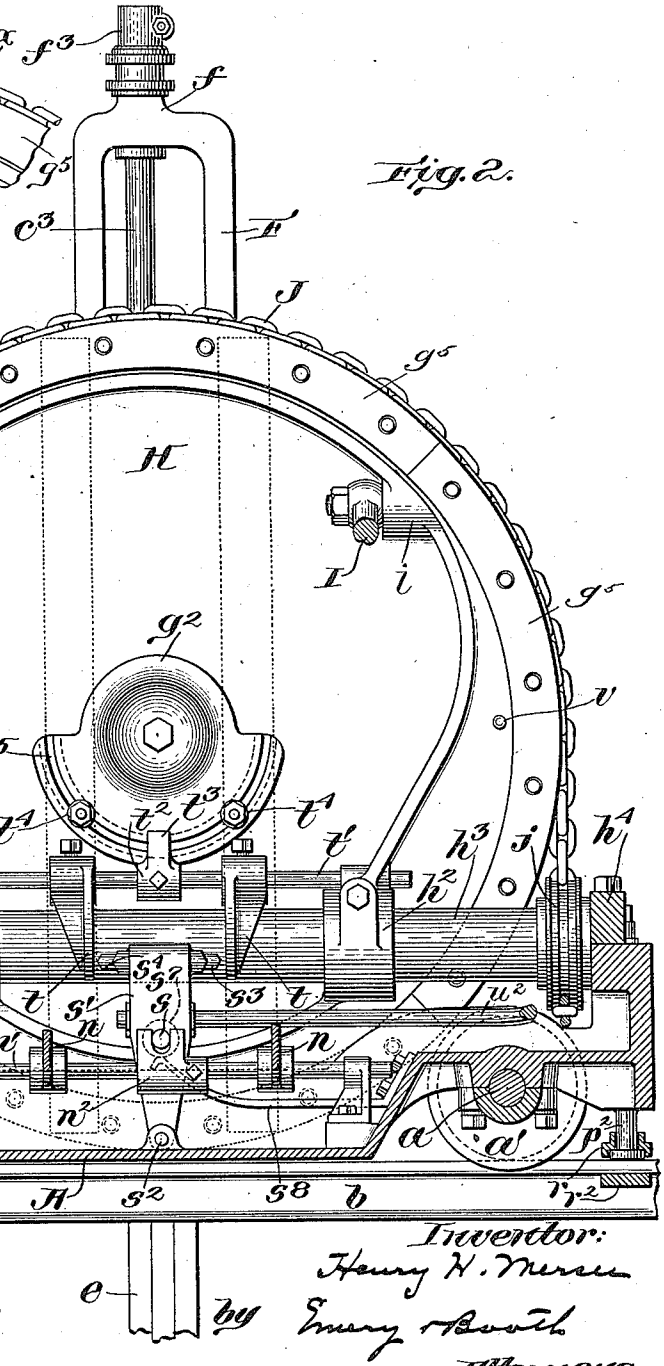

Fig. 2.

Witnesses:
Archie B. Colbath.
Robert H. Kammler.

Inventor:
Henry H. Mercer
by Emery Booth
Attorneys.

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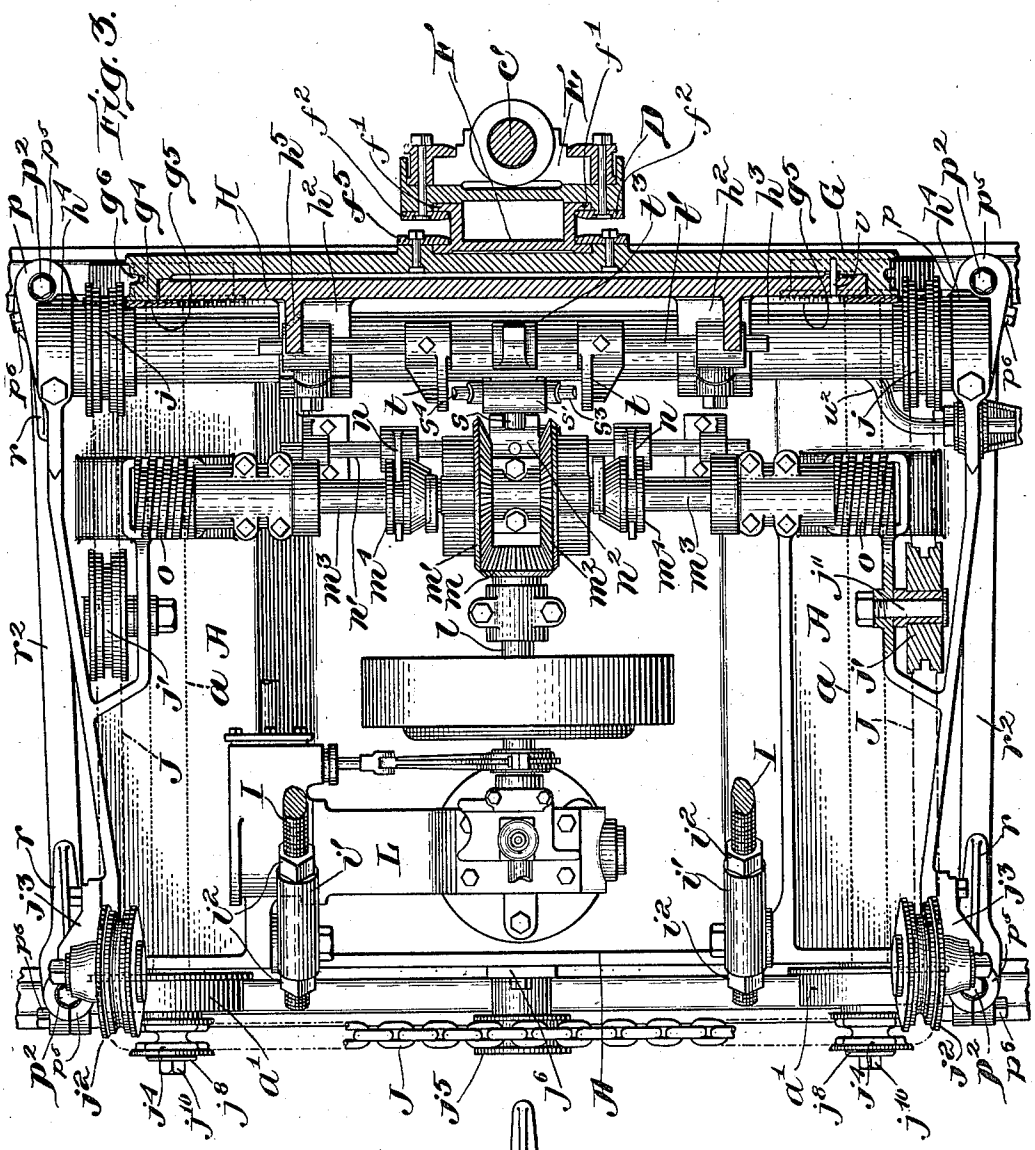

Fig. 3.

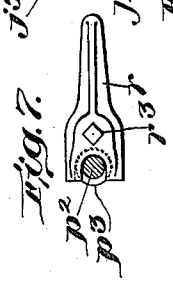

Fig. 7.

Witnesses:
Archie B. Colbath.
Robert H. Kammler

Inventor:
Henry H. Mercer
by Emery Booth
Attorneys.

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4 SHEETS—SHEET 4.

Fig. 4.

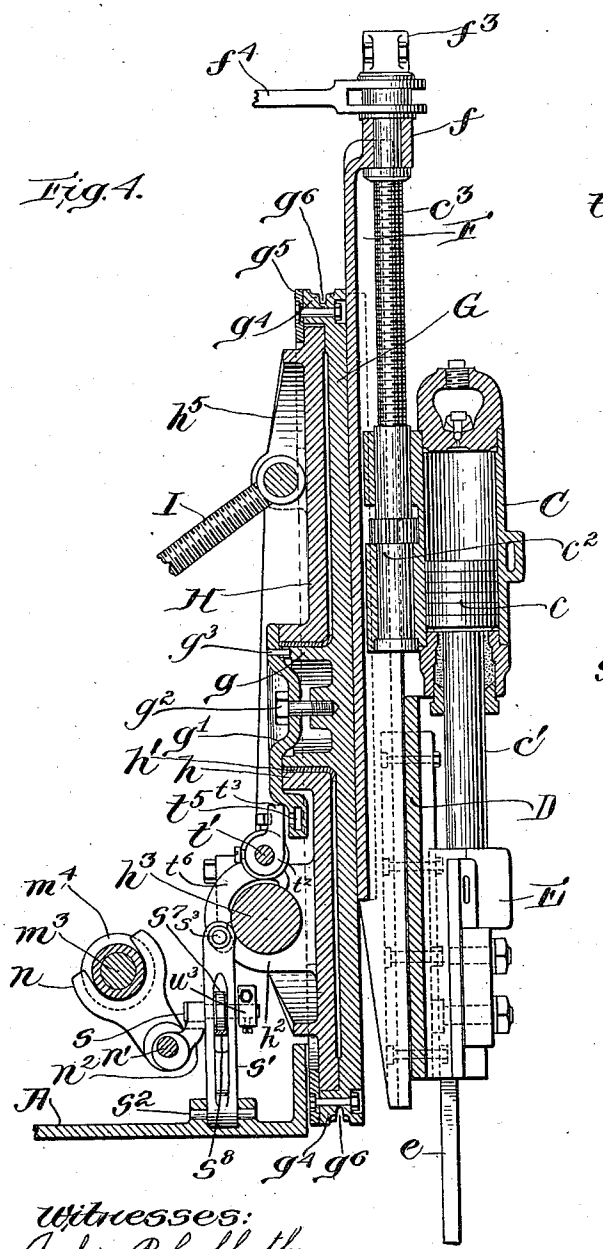


Fig. 5.

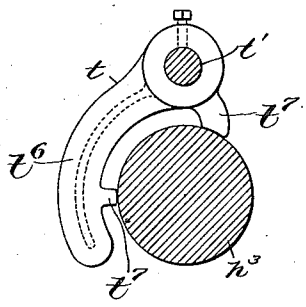
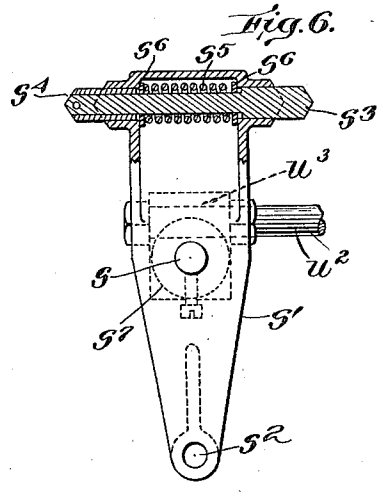


Fig. 6.



Witnesses:
Archie R. Colbath
Robert H. Kammler.

Inventor:
Henry H. Mercer
by Emery Booth
Attorneys.

UNITED STATES PATENT OFFICE.

HENRY H. MERCER, OF CLAREMONT, NEW HAMPSHIRE, ASSIGNOR TO SULLIVAN MACHINERY COMPANY, OF CLAREMONT, NEW HAMPSHIRE, A CORPORATION OF MAINE.

CHANNELING-MACHINE.

1,011,221. Specification of Letters Patent. Patented Dec. 12, 1911.

Application filed November 16, 1906. Serial No. 343,689.

To all whom it may concern:

Be it known that I, HENRY H. MERCER, a citizen of the United States, residing in Claremont, county of Sullivan, and State of New Hampshire, have invented an Improvement in Channeling-Machines, of which the following description, in connection with the accompanying drawings, is a specification. like letters on the drawings representing like parts.

My invention relates to stone-working machines, the purpose thereof being to increase the effectiveness of such machines.

While this invention may be applied to stone-working machines of various types and for various purposes, it is here illustrated as applied to a track channeling machine constructed not only for cutting the usual channel groove, but especially adapted for corner-cutting, that is, the cutting of the channel groove into the acute angle or corner underlying the inclined side of a quarry wall.

In the specific embodiment of the invention the corner-cutting is effected by so mounting the tool support that, while operating as usual in the open part of the quarry it may be made to cut from a fixed position of the machine under the overhanging side-walls while the tool swings along the arc of a circle lengthwise the channel groove, delivering its blows perpendicularly to the bottom of the groove and thereby losing none of the effectiveness of its cutting stroke.

My invention, having as it does other objects both connected with and disconnected from the above-mentioned aim, will be best understood by reference to the following description, when taken in connection with the accompanying illustration of one specific embodiment thereof, while its scope will be more particularly pointed out in the appended claims.

In the drawings:—Figure 1 is an end elevation of a channeling machine embodying one form of my invention. Fig. 2 is a section in elevation on the line 2—2 of Fig. 1 looking in the direction of the arrow. Fig. 3 is a plan view partly in section on the line 3—3 in Fig. 1. Fig. 4 is a central sectional elevation of the parts at one side of the machine. Fig. 5 is a detail showing one of the pair of tappets. Fig. 6 is an elevation partly in section showing the detail of the tappet actuated rocker arm. Fig. 7 is a detail in plan of the upper rail clamp. Fig. 8 is a section taken through the driving sprocket on the driving axle, and Fig. 9 is a detail showing a modified form of the machine.

Referring to the drawings and to the embodiment of the invention there submitted for illustrative purposes, the track channeling machine there shown is supported upon a carriage or frame work A which has journaled at opposite ends the two transverse shafts a provided near their outer ends with pairs of flanged trucks a', the latter tracking with rails b, which are customarily laid upon the quarry bottom and along which the machine, when cutting in the usual fashion, is advanced.

The machine carries suitable tool-reciprocating motive means, which may be of any suitable form, but which is here shown (Fig. 4) as a compressed air, direct-acting engine, supplied with pressure fluid from a suitable source (not shown) and having the piston c, cylinder C and the cross-head guides D. The cross-head E, which is connected to the piston by the piston rod c', has clamped thereto a suitable tool or tools, such as the gang e of three channeling tools shown partly broken away, the cutting ends of the latter, therefore, being given a reciprocatory cutting movement to and from the bottom of the channel groove with the reciprocations of the engine piston. For adjustably feeding the tool toward the work as the channel groove deepens, the engine cylinder and cross-head guides, which are connected to move as a unit, are carried by the cutter head or standard F, and may be advanced along its face by means of the fixed threaded member c^2 on the cylinder and engaged by the longitudinal adjusting screw c^3, which latter at its upper end is journaled in an extension f of the cutter head.

The cutter head (Fig. 3) is provided with suitable guiding ribs or flanges f' on which the engine cylinder and the attached cross-head guides are slidably retained by the gibs f^2 and along which they may be adjusted longitudinally by the adjusting screw c^3. The latter at its upper end is provided with a head f^3 through which, by the attachment of a suitable tool or implement, such as the ratchet lever f^4 (Fig. 4), the

screw may be turned and the engine and cross-head advanced toward the work as the channel groove deepens.

To obtain the swinging movement of the tool length-wise the channel groove during corner cutting, the cutter-head F is supported at the side of the machine upon an oscillating or swinging support G, the latter comprising a circular plate or casting, having formed in its face (Figs. 3 and 4) a longitudinal depression or guide way, in which the standard is adjustably clamped by means of the clamping-plates f^5, which are bolted to the plate G. The clamping-plates hold the standard in fixed position, but the clamping-bolts may be loosened to permit it to be adjusted longitudinally, so that the entire standard with its attached cutting appliances may be dropped or advanced toward the work and clamped in this advanced position. The clamping-plates preferably extend, as shown, across the entire face of the supporting-plate G, so that when the standard is adjusted to a more advanced position it is maintained in accurate alinement with reference to the center of the plate, the line of reciprocatory tool action lying preferably across the oscillation axis of the plate.

In order to provide an oscillating or swinging movement for the cutter-head and the tool lengthwise the channel groove when the machine is employed for corner cutting, the support G is mounted to swing through any desired arc in the main supporting-frame, which latter is mounted at the side of the machine, as shown in Fig. 1. To permit the oscillating movement of the cutting parts the plate G has the centrally formed trunnion g journaled in a bearing h, the latter formed in the frame H and provided with the removable lining h'. The plate is held in position by the cap g', fastened to the trunnion by the bolt g^2 and prevented from turning thereon by the pin g^3. (Fig. 4).

When angle cutting is desired the main frame H is adjustable about an axis lengthwise the channel groove, so that it may be inclined backward away from the vertical, to some such position, for example, as is represented in Fig. 1 by dotted lines. To permit this adjustment it is provided (Figs. 2 and 3) at its back and near its bottom with split brackets h^2, by which it may be fixedly but adjustably clamped to the shaft h^3, the latter fixedly held at its ends in the carriage frame A by the cap pieces h^4. The supporting frame H is held during cutting in either an upright or an inclined position as may be desired by any suitable means, such as the pair of inclined brace rods I, (Figs. 2 and 3) the latter bolted each at its upper end to a boss i at the back of the supporting frame H and at its lower end (Fig. 3) secured to a bracket i', adjustably bolted to a seat upon the main frame A. The threaded brace rod I passes entirely through a sleeve upon the bracket i' and is adjustably secured thereto by checknuts i^2, so that its length may be adjusted to permit the necessary inclination of the supporting frame. The back of the supporting frame is strengthened by a rib h^5, which connects the brackets h^2 and the lugs i.

For reciprocating or oscillating the cutter head during corner cutting the circumferential edge of the oscillating plate G is carried back and over the edge of the supporting plate H to form the flange g^4 (Figs. 3 and 4) to which is bolted the segmental gibs g^5, the latter overlying the back edge of the supporting frame H so that the plate G may be turned back and forth through any angle upon the frame while held in secure alinement therein.

In the illustrated embodiment of my invention the plate G is turned through direct engagement of a driving member with the outer flanged edge thereof, such driving member in the present instance consisting of a flexible cable chain J, passing over and about the uppermost half of the plate perimeter. The flanged edge of the latter is approximately grooved and toothed as at g^6 to receive the cable chain J, so that the plate constitutes in effect a large sprocket wheel. Although the groove and teeth may be extended about the oscillating plate G for its full circumference, since it will ordinarily be required to oscillate through a limited arc only, they need usually extend over a short portion only of the circumference. Instead of sprocket teeth a pair of pins or the like, such as are represented at x (Fig. 9), on either side of the central upper portion of the edge of the oscillating plate may be employed, such pins remaining in engagement with the links of the cable chain for a limited range of movement. At each side of the plate the driving chain J passes (Figs. 1, 2 and 3) down and about a guiding sprocket wheel j, thence up and over an intervening idle sprocket wheel j' to the somewhat inclined guiding sprocket wheel j^2, the latter journaled upon brackets j^3 clamped to the frame at each rear corner of the machine. From the guiding sprocket wheels j^2 the chain passes downward at the rear of the machine and to the under side of the two toothed driving sprocket wheels j^4, the latter carried by and fixedly secured to the end of the driving axles a. Between the driving sprocket wheels j^4 there is an intermediate guiding sprocket wheel j^5, over which the chain passes so that the latter is held in good contact with the underside of the driving sprocket wheels. During the swinging movement of the cutter-head the machine trucks, as will more fully appear, are raised

up from the tracks and the chain, constituting as it does an endless driving member, is moved by the driving sprocket wheels j^4 alternately in opposite directions to impart swinging movement to the plate G. The idle sprocket wheel j' is mounted on a stud j^{11} (Fig. 3) and the latter is adjustably clamped to the frame so that it may be raised or lowered in a suitable slot j^{12} in the frame and the chain tightened or loosened as desired. It will be observed that since the guiding sprocket wheels j have their axes coincident with the axis about which the frame H is adjustably tipped for angle cutting, and since the said sprocket wheels are of relatively small pitch diameter and with the sprocket wheel groove on the plate G are preferably constructed so that the same straight line is tangent to the pitch circle of both sets of sprocket wheels, the supporting plate H may be adjustably tipped backward or forward without disturbing the required alinement of the driving chain and without tightening or loosening the chain save by a comparatively small amount, which can readily be compensated for by adjustment of the idle sprocket wheel j' or j^5. Although a chain driving member is shown, it will be observed that other flexible driving members may be used, and that driving devices other than flexible might be employed.

The described construction provides a very simple form of drive, since it is simple and inexpensive in the first instance and is capable admirably of standing rough handling in the quarry.

Any suitable means, either manual or power driven, for giving reciprocating driving movement to the driving sprocket wheels j^4 may be employed, but herein I have shown a special motive device (Fig. 3) comprising the fluid pressure engine L, which is connected to turn the transverse driving shaft l. The engine is connected by a flexible hose connection (not shown) to a source of compressed air supply and is controlled as to speed by a suitable throttle valve not shown. The transverse shaft l carries at its end the beveled pinion m, which imparts opposite but equal rotation to the two beveled gears m' and m^2. These may be separately clutched to or unclutched from the clutch shaft m^3 by the sliding movement of the double clutch member m^4, m^4. The movement of the latter is effected through the pair of yoke shaped arms n, embracing each a circumferential groove upon the corresponding clutch member m^4 and pinned or otherwise suitably secured to the reversing slide rod n', which is mounted on brackets upon the carriage frame and adapted to slide in a direction parallel with the clutch shaft m^3. When the rod is shifted in one direction it clutches the gear m' to the clutch shaft, but when shifted in the opposite direction it clutches the gear m^2 to the said shaft.

During the cutting of the ordinary channel groove the necessary traversing movement is given to the carriage through the clutch shaft m^3. The latter carries at each end a worm o, meshing (Fig. 1) with an underlying worm gear o', the latter secured to the carriage shaft or axle a. Through this means, which acts to drive the truck wheels of the carriage, the latter may be moved under its own power in either direction according to the position of the clutch m^4.

During corner cutting the carriage is maintained stationary and the trucks lifted clear of the track. When this occurs movement is transmitted from the engine through the clutch shaft m^3, and the driving axles to the driving sprocket wheels j^4 and thence to the driving chain J for oscillating the cutter head.

For lifting the machine off the tracks there is provided at each front corner of the frame a lug p (Fig. 1) and at each rear corner the bracket j^3 threaded vertically at p' to receive the jack screws p^2, the latter having feet p^3 which aline with the top of the rails and an intermediate and enlarged threaded portion p^4 which passes through a split portion p^5 of the bracket or lug. After the screws are turned down to jack up the machine the split portion of the bracket is clamped tightly about the screws by means of bolts p^6. The enlarged feet of the screw are partly embraced (Figs. 1 and 3) by the upper movable member r of a rail clamp. The member r is fulcrumed at r' on the underlying clamp member r^2, two of which are provided one at each end of the machine extending across from rail to rail and underlying the rail flange at each end. When the machine is moved along the track, these clamps are sustained by the feet of the jack screw. After the carriage is lifted from the track the clamps are clamped solidly to the rails p by the bolts r^3 so as to hold the machine fixed while doing the corner cutting. Obviously other means may be employed to support the machine during corner cutting, and, if desired, the jack screws may rest directly upon the quarry bottom or in holes drilled in the quarry bottom.

The transmission mechanism described causes the engine L to swing the cutter head about the supporting plate A during corner cutting with a comparatively slow swinging movement simultaneously with the rapid chopping or percussive action of the tool under the influence of the tool engine C. When the swinging movement has advanced far enough in one direction, the reversing rod n' may be shifted and the swinging movement reversed. Such reversal may be

effected by hand, but I have herein shown not only means for manually effecting this result, but also automatic means as well. For this purpose the reversing rod n' has fixed thereon (Figs. 1, 2 and 3) a sleeve n^2 provided with two upwardly and forwardly inclined ears embracing a pin s carried by a swinging lever arm s'. the latter pivoted at s^2 upon the bottom of the machine frame. Near its upper end the rocker arm s' is provided with oppositely directed lateral projecting pins s^3 and s^4 which lie within the path of a pair of tappets t, which latter are secured to the reciprocatory slidable shipper rod t'. The latter is mounted to slide in the brackets h^2 at the back of the supporting frame H. When the rod is moved in one direction one of the tappets engages with the pin s^3 throwing the rocker arm in the same direction and thereby clutching in the gear m^2. When shifted in the opposite direction the pin s^4 is engaged by the other tappet and this throws the gear m' into engagement, and the gear m^2 out of engagement, with the pinion m.

Adjustably secured to the shipper rod t' is a sleeve t^2 having an upright lug t^3 which lies within the path of a pair of projecting rolls t^4 which are adjustably bolted (Fig. 2) at any selected points along an arc shaped slot t^5 formed in a depending segmental portion of the cap g^2. The face of the cap along and adjacent the slot may be graduated if desired so that the rolls may be set to any desired angular position therein, and the movement of the cutter head automatically reversed at any precise angular inclination desired. By this means the tool may be made repeatedly to swing automatically through any desired arc and to any desired inclination.

The tappets t have each an arc shaped face t^6 (Fig. 5) and have a pair of inturned fingers t^7 which engage with the surface of the shaft h^3, so that when the plate h' is adjustably tipped backward the tappets still engage with the rocker arm in any of the possible positions of the plate and the adjustment of the reversing mechanism is not thereby affected.

In order to provide a slight yield between the tappets and the clutch the rocker arm (Fig. 6) is suitably formed to receive a stiff spring s^5 held between the washers s^6. These washers, which are pressed against the walls of the rocker arm abut against shoulders on the pins s^3 and s^4 and prevent their movement in either direction so that when struck by its tappet either pin transmits such blows yieldingly to the rocker arm. To simplify construction the necked down or reduced end of one pin is extended and in conjunction with a surrounding sleeve forms also the opposite projecting pin.

In order normally to hold the rocker arm at one side or the other of its neutral position, the same is provided with a roll s^7 against which presses a leaf spring s^8, (Fig. 2) the roll being engaged by an inverted V-shaped portion of the spring so that the arm tends to remain where thrown except when forcibly pushed in the opposite direction.

For the manual reversal of the swinging movement there is provided at one end of the machine (Fig. 1) the upright hand lever u, pivoted as at u' upon the frame. Jointed to the hand lever above its pivotal attachment to the frame is the forked end of the hand shipper rod u^2, the opposite end of which is secured (Figs. 4 and 6) to the attaching collar u^3, the latter fastened to the forward projecting end of the pin s upon the rocker arm s'. In moving the hand lever in one direction or the other, therefore, the rocker arm may be thrown directly through its connection with the hand lever. The hand lever may be used either in substitution for the automatic reversing mechanism or in conjunction therewith, but it will be seen that by the described means the swinging movement of the cutter head may be reversed either automatically or by hand.

In the operation of the machine the main portion of the channel groove is cut in the ordinary fashion with the supporting frame held either vertically or inclined backward for angle cutting. During this operation the driving chain J is operatively disconnected from the driving mechanism and the plate G is preferably clamped or locked to the supporting frame H by some suitable means, such as the locking pin v.

A simple way of operatively disconnecting the chain from the driving mechanism without the necessity of actually removing the same will be sufficiently shown by the construction in Fig. 8. The driving sprocket wheel j^4 having the removable lining j^7 is mounted upon the reduced end of the axle a so as to be capable of freely turning thereon unless otherwise prevented. During the oscillatory movement of the tool the sprocket wheel is clamped tightly against the hub of the truck a', so as to be driven with and by the axle, through means of the clamping washer j^8, the latter prevented from turning by the pin j^9, and adapted to be clamped against the face of the sprocket wheel by the clamping nut j^{10}. When the oscillation of the tool is to be stopped it is necessary merely to loosen the nut j^{10} whereupon the axle a will turn idly within the lining of the sprocket wheel and without effect upon the chain.

When the overhanging side wall of the quarry is reached, the machine is lifted free from the rails and clamped thereto, the driving chain placed in operative relation to the driving mechanism, and the tool then given in addition to its usual reciprocatory

percussive movement to and from the work, an oscillating movement as well through any desired angle so that the tool travels lengthwise the channel groove in an arc like path and its blows are delivered radially from the center of oscillation of the cutter head.

The adjustment of the cutter head to and from the work, which is permitted by the clamping plates f^5, permits the corner cutting to be done and particularly at extreme angles with tools of much lesser length, since by this adjustment the cross-head may be brought into substantially the same close relation to the rock in corner cutting and angle cutting, as in upright cutting. While the guides are preferably so located upon the supporting plate that the line of adjustment of the cutting tool lies across the oscillation axis of the cutter-head so that the blows are delivered radially from the center of oscillation, the cutter-head, if desired, may be so mounted as to be displaced at one side of the center of oscillation.

While I have shown and described one form of my invention for the purpose of illustrating the same, it is to be understood that in details of construction and relative arrangement of parts, as well as in the application here made of the invention, the described embodiment may be widely deviated from without departing from the spirit of the invention.

Claims.

1. A channeling machine having a reciprocatory tool, means for swinging the tool about an axis transverse to the plane of the channel groove, and means for automatically reversing the swinging movement.

2. A channeling machine having a reciprocatory tool mounted to swing lengthwise the channel groove, means for swinging the same and means for adjustably fixing the limit of swinging movement.

3. A channeling machine having a reciprocatory tool mounted to reciprocatively swing lengthwise the channel groove and means for automatically limiting the angle of the swinging movement.

4. A channeling machine having a reciprocatory tool mounted for swinging movement lengthwise the channel groove and means either manually or automatically to control the swinging movement.

5. A channeling machine having a channeling tool, means for swinging the same about an axis transverse the channel groove and means automatically to reverse the swinging movement when a given limit of swing has been reached.

6. A channeling machine having a tool, a traveling support upon which said tool is mounted, means to move the same lengthwise the channel groove, driving means for swinging the tool about the support lengthwise the channel groove, and means for automatically reversing the swinging movement.

7. A channeling machine having a cutter head mounted for swinging movement about an axis transverse the channel groove, cutting means thereon, power actuated means for imparting movement to the cutting means, power actuated means for swinging the cutter head during cutting movement and means automatically to reverse the swinging movement.

8. A channeling machine having a cutter head mounted for swinging movement lengthwise the channel groove, power actuated means for swinging the cutter head during cutting movement and means for adjustably fixing the angle of the swing.

9. A channeling machine having a pivoted tool support, driving means for swinging the tool support about its pivot, reversing means for reversing the movement of said driving member, actuating means for said reversing means and means carried by said swinging tool support for acting upon said actuator means alternately in the opposite direction.

10. A channeling machine having a pivoted tool support, driving means for swinging the same, reversing means for reversing the driving movement, actuating means for actuating said reversing means, and means carried by said tool support and adjustable relatively to said actuating means for engaging the latter and effecting reversal of said driving means.

11. A channeling machine having a pivoted tool support, driving means for swinging said support, a reversing member for reversing the driving movement, a pivoted arm connected to move said reversing member, a sliding shipper rod mounted to engage with said arm in either direction of its movement and adjustable means carried by said tool support for moving said rod and acting thereby automatically to reverse the swinging movement of the support.

12. In a channeling machine the combination with a swinging tool support of means for swinging said support and means for reversing swinging movement comprising an actuating lug and a pair of members adapted on swinging movement of the tool to engage the said lug alternately in opposite directions, and means permitting relative adjustment of said lug and said members whereby the angle of swinging movement may be adjusted.

13. A channeling machine having a tool support mounted for tipping adjustment about an axis lengthwise the cutting plane, means for swinging said support lengthwise the cutting plane and about an axis transverse thereto and means automatically to reverse the swinging movement.

14. A channeling machine having a

swinging tool support an endless chain for swinging said support and means for imparting movement to the chain for swinging the support.

15. A channeling machine having a swinging tool support an endless flexible driving member for swinging said support and means for imparting movement to the driving member for swinging said support.

16. A channeling machine having a swinging tool support adapted for tipping adjustment about an axis lengthwise the cutting plane, a rotary guiding member a flexible driving member connected to swing said support and passing about a rotary guiding member mounted upon the tipping axis of said support and means for imparting movement to the flexible driving member.

17. A channeling machine having a swinging tool support mounted for tipping adjustment about an axis lengthwise the channel groove, a flexible driving member for said support means for imparting movement to the said driving member and guiding members for said driving member mounted upon the tipping axis of the support.

18. A channeling machine having a swinging tool support, a sprocket wheel connected therewith, a flexible driving member passing over the sprocket wheel, and a driving sprocket wheel to swing said support through said driving member.

19. A channeling machine having a swinging tool support, a sprocket wheel connected therewith, and endless chain passing over said sprocket wheel, a guiding sprocket wheel at the side of said tool support and one or more driving sprocket wheels also engaged with said chain.

20. A channeling machine having a swinging tool support mounted for tipping adjustment about an axis lengthwise the channel groove, an endless flexible driving member connected to swing said support means for imparting movement to the said driving member and guiding members mounted upon the tipping axis.

21. A channeling machine having a swinging tool support, a flexible driving member connected to swing said support, a carriage, means for progressively moving said carriage and means driven by said carriage driving means for moving the flexible driving member.

22. A channeling machine having a carriage, a driving axle, a swinging tool support, a flexible driving member connected to swing said tool support, and a driving member upon said carriage axle adapted to engage with said flexible driving member.

23. A channeling machine having a carriage, a swinging tool support at the side thereof, means for adjustably tipping said support about an axis lengthwise the channeling groove, guiding members at the side of said tool support, a driving axle, a driving member upon said axle, and an endless flexible driving member engaging with said driving member, said guiding members and said tool support for effecting swinging movement of the latter.

24. A channeling machine having a tool support, a flexible driving member for swinging the tool, means for adjusting said tool support for angle cutting and means for taking in or letting out slack in said flexible driving member to adapt it to a changed position of the support.

25. A channeling machine having a swinging tool support, a driving shaft, a flexible driving member operatively connecting said shaft to said support and means for disconnecting said driving member from said shaft.

26. A channeling machine having a swinging tool support, a carriage, a driving axle, a sprocket wheel on said axle, a driving chain passing over said sprocket wheel and connected to swing said tool support and means for disconnecting said sprocket wheel from said axle.

27. A channeling machine having a swinging tool support, means for reversing the swinging movement thereof, automatic actuating means therefor, and yieldable connection between said actuating means and reversible means.

28. A channeling machine having a pivoted tool-support, a truck, means for driving the truck, tool-swinging means connected to the truck driving means, and means for disconnecting the tool-swinging means at will.

29. A channeling machine having a truck, a pivoted tool support, a truck driving shaft, driving connections between the same and the tool support, and means for disconnecting the shaft from the tool support.

30. A channeling machine having a swinging tool support, a truck, a driving axle for the truck, and connections between the driving axle and the support for imparting swinging movement to the latter.

31. A channeling machine having a truck, a swinging tool support, truck driving means and means connecting said truck driving means with said support for imparting swinging movement to the latter, said means including a flexible driving member and means for operatively disconnecting said flexible member from said truck driving means, while still leaving the same in position upon the machine.

32. In a channeling machine, the combination with a percussive channeling tool provided with a cutting end, of a support upon which the same is pivotally mounted for swinging movement, means to hold the

support rigidly fixed upon the quarry bottom adjacent an overhanging side wall of the quarry and with the tool positioned to swing reciprocatively through a plane transverse to the quarry bottom from an upright position to a forwardly inclined position beneath said wall, power-driven means for swinging the tool about its pivotal support to extend the channel in the quarry bottom beneath the overhanging side wall, and means for automatically reversing the swinging movement of the tool.

33. A channeling machine adapted to be moved progressively for cutting an ordinary channel groove, means for holding the channeling tool fixed during such progressive cutting movement, means for holding the machine fixed, means for swinging the tool when the machine is so held, and means for automatically reversing the swinging movement of the tool.

34. A channeling machine having a wheeled truck, a driving motor thereon, means for holding the tool fixed while the truck is advanced for progressively cutting the ordinary channel groove, means for connecting the truck driving motor to swing the tool, means for holding the truck fixed during such swinging movement of the tool, and means for automatically reversing the swinging movement thereof.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

HENRY H. MERCER.

Witnesses:

JAMES R. BRUCE,

ELMER G. GLIDDEN.