

July 12, 1927.

M. P. HOLMES

1,635,623

MINING APPARATUS

Original Filed Dec. 16, 1915 3 Sheets-Sheet 1

Fig. 1.

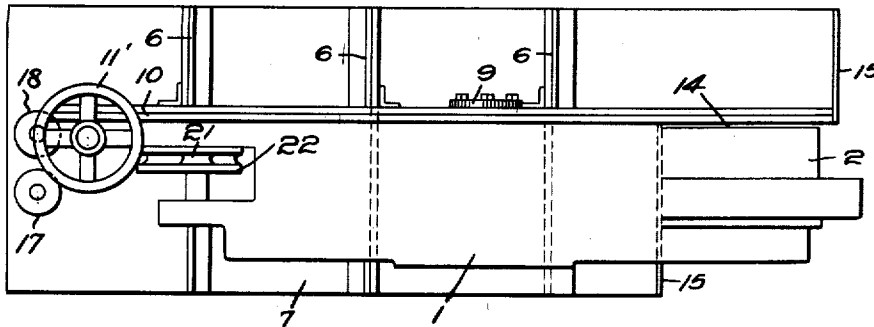


Fig. 2.

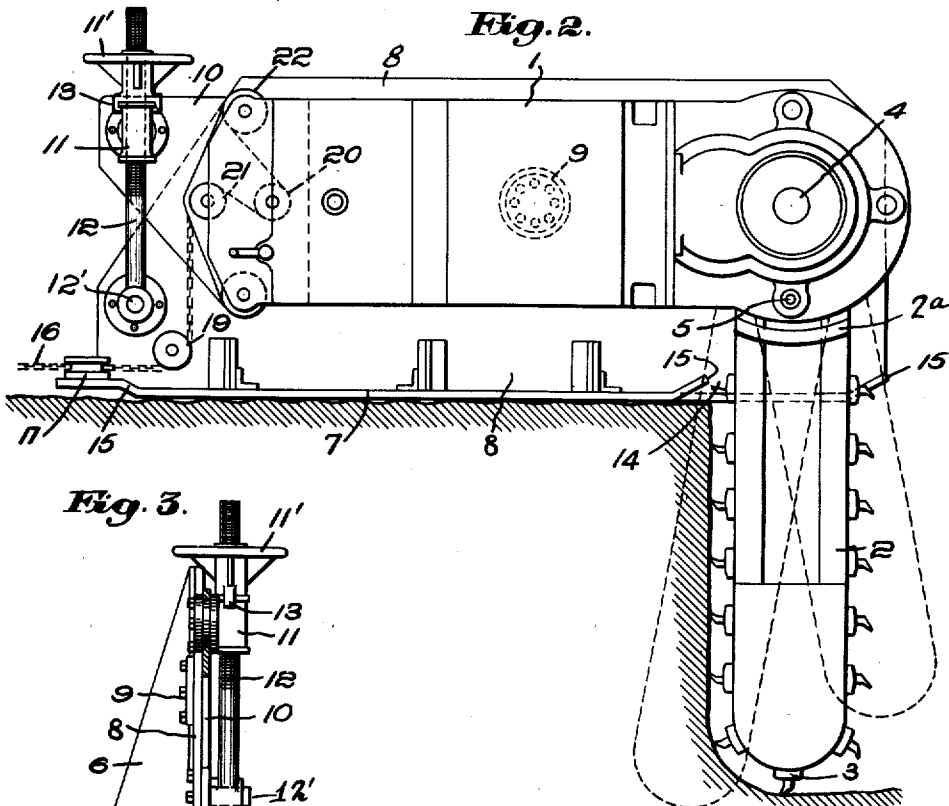
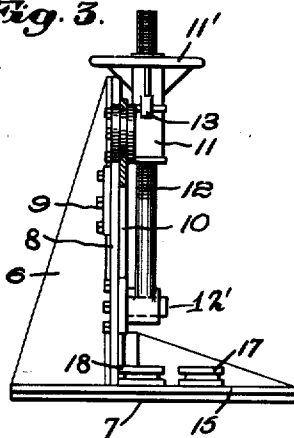


Fig. 3.



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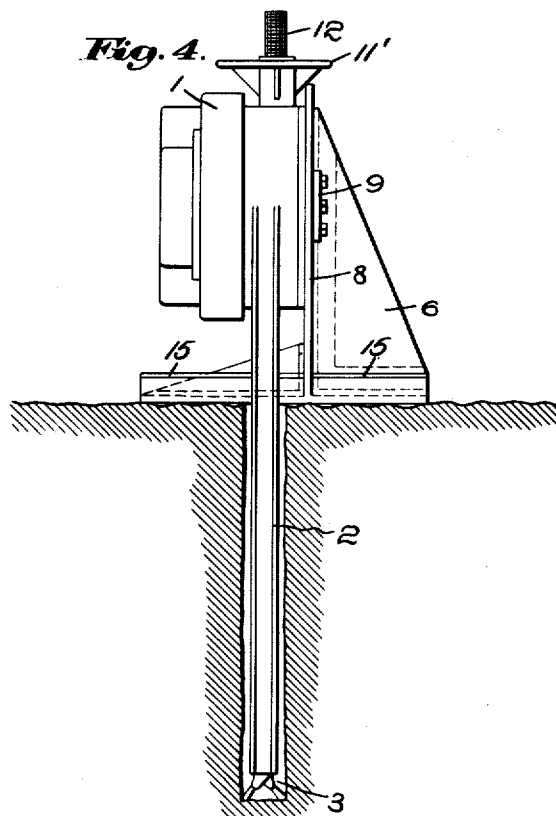
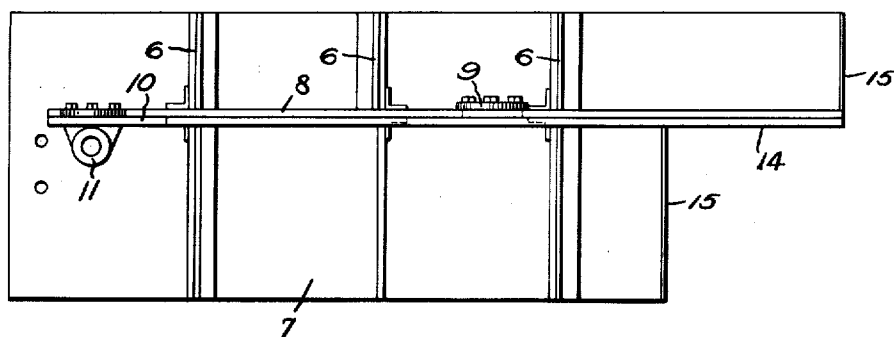


Fig. 5



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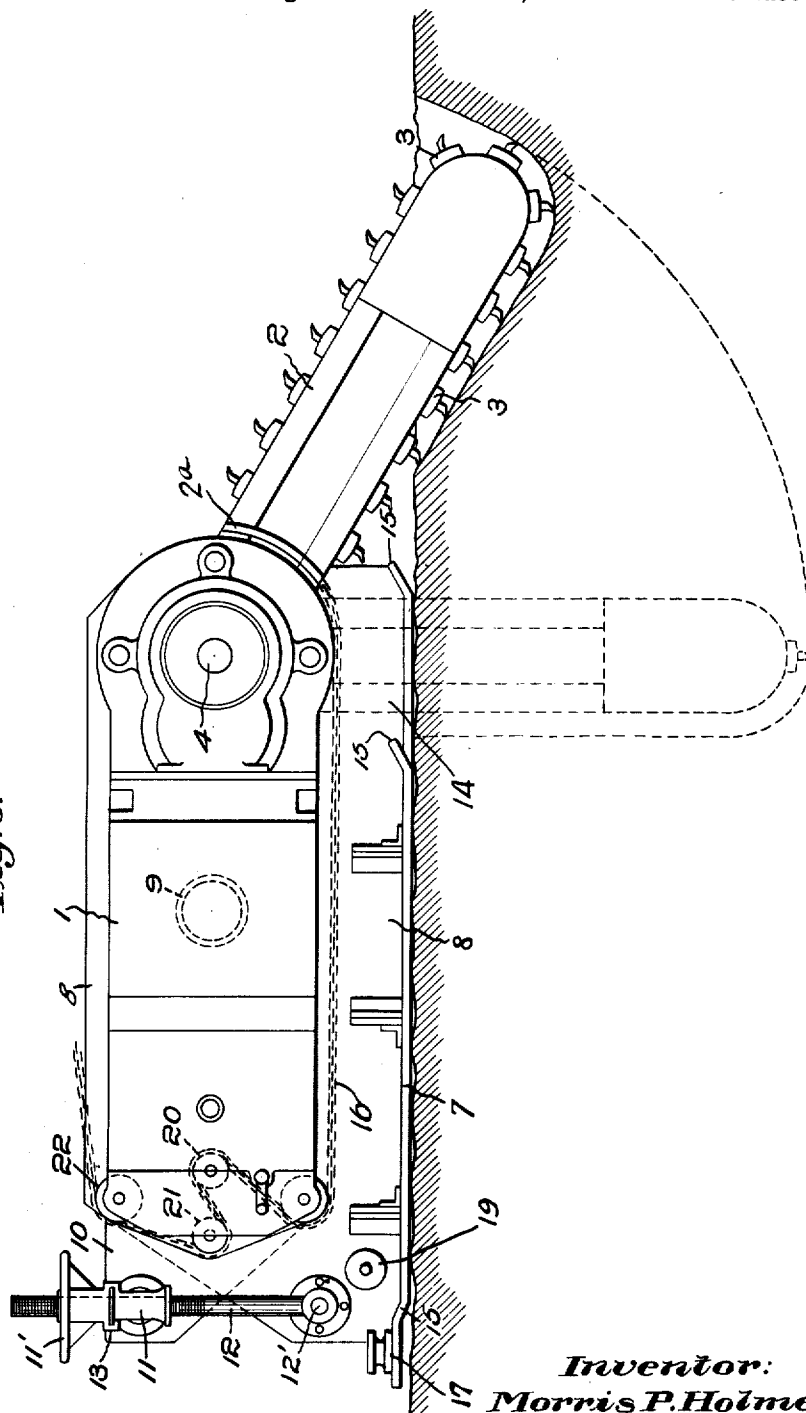
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MINING APPARATUS

Original Filed Dec. 16, 1915 3 Sheets-Sheet 3

Fig. 6.



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UNITED STATES PATENT OFFICE.

MORRIS P. HOLMES, OF CLAREMONT, NEW HAMPSHIRE, ASSIGNOR TO SULLIVAN MACHINERY COMPANY, OF CLAREMONT, NEW HAMPSHIRE, A CORPORATION OF MASSACHUSETTS.

MINING APPARATUS.

Application filed December 16, 1915, Serial No. 67,097. Renewed February 10, 1925.

This invention pertains to improvements in kerf cutting apparatus and more particularly, though not exclusively, to mining machines adapted to cut downwardly disposed
5 kerfs in coal.

Referring to the drawings:

Fig. 1 is a plan view of one embodiment of my invention;

Fig. 2 is a side elevation thereof in operation;
10 tion;

Fig. 3 is an end elevation of a preferred form of support which in combination with a mining machine constitutes a preferred construction of my invention;

Fig. 4 is an end elevation of the mechanism shown in Figs. 1 and 2;

Fig. 5 is a plan view of the preferred form of support illustrated in Fig. 3;

Fig. 6 is a side elevation of the embodiment of my invention shown in Fig. 2 showing a preferred method of making the initial cut.

Under some conditions it is desirable and even necessary in mining coal to work from
25 the top of the coal stratum instead of digging into it laterally. This is peculiarly advantageous when the "open pit" system of mining is used, the coal strata relatively near the surface being exposed, preferably by
30 steam shovels. Various methods of breaking up and removing such coal have been used but the method almost universally used in open pit work at the present time is to drill holes into the coal stratum and "shoot
35 it from the solid". In some instances the coal is shot adjacent a face already broken down in which event the coal can be broken by relatively small charges of powder, but this method necessarily restricts the area
40 which can be worked and is to some extent incompatible with the most efficient working to capacity of the steam shovel or other stripping or uncovering agent. To enable the stripping or uncovering force to work more
45 nearly to capacity, the coal is largely drilled at a distance from the face already broken down. As the stratum is unrelieved except on the surface large charges of explosives are essential which are very expensive and
50 which reduce the value of the product by reducing a good deal of the coal to powder.

Briefly, the purpose of my invention is to

relieve the coal to be shot by cutting downwardly disposed kerfs through it. These downwardly disposed or vertical kerfs may
65 either divide the coal strata into long strips, or squares, parallelograms, or any other desired sections, the extent, shape and disposition of the kerfs depending largely on the mine and the rate at which it is desired to
60 produce the product.

After cutting the kerfs the coal may be broken down easily by small charges of powder or any other preferred means. The relieving of the lateral support and the use of
65 small charges of powder enable the coal to be broken up without reducing any considerable percentage thereof to powder.

The top of the coal strata presenting the most conveniently disposed supporting surface and usually being relatively smooth, I preferably practice my invention with a cutting agent adapted to be supported by and
70 slidably traverse along the top of the coal stratum, while a downwardly extending cutting element depends therefrom into the coal stratum and is fed along by a tractile
75 element above the surface.

Referring to the drawings and to the preferred embodiment of my invention which I
80 have chosen for illustrative purposes, I preferably provide a mining machine 1 which may, if desired, be of the type illustrated in the co-pending application of Albert Ball and the present inventor, Serial No. 524,936,
85 since patented on May 30, 1916, No. 1,185,279 preferably provided with a cutter bar 2 having a draw cut cutter chain 3. The mining machine may be and preferably is of
90 a type having the cutter bar 2 adapted to be swung relative to the machine while operating and to be locked relative to the machine when desired. In the present instance the cutter bar 2 is pivotally mounted to
95 swing about the axis 4 or to be locked in fixed relation to the machine by a locking pin 5 or any other suitable locking means.

To perform the function which it is the object of the present invention to perform, I preferably provide supporting means
100 adapted to hold the machine in such relation to the work that a downwardly disposed kerf can be cut and to this end I preferably provide a portable base preferably consist-

ing of a shoe or skid 7 adapted to slide along the mine bottom and an upright support 8 on the shoe 7, said portable base preferably having one or more webs 6 for stiffening

5 and strengthening purposes.

In the illustrative embodiment of my invention illustrated, I have shown pivotal attachment means 9 on the support 8 for holding the mining machine 1, the latter
10 being preferably provided with a projecting plate 10 having attached thereto a swiveled element 11 adapted to surround a threaded bolt 12, the bottom end of said element being swiveled as at 12' to the support
15 8 and the top end being provided with a hand wheel 11' having threads engaging the threaded bolt 12 and a collar portion 13 engaging a recess in the swiveled element 11.

The plate 10, swiveled element 11, bolt 12
20 and cooperating parts constitute a preferred form of angular adjusting mechanism for swinging the mining machine where lateral pivotal supporting means is used. The mining machine is of course pivoted at such a
25 point that the weights at the opposite sides of the pivot points are as near equal as possible, thereby rendering shifting easy. The purposes of the angular adjusting mechanism are to vary the angle of the cutter bar 2 to
30 the work when it is fixed relative to the mining machine, and also to permit variations in the depth of cut, which is useful not only to accommodate the machine to strata of different thickness, but to enable
35 the bottom of the kerf to vary to follow uneven portions of the bottom of the stratum, sulphur balls and the like.

To provide a large bearing surface of the shoe 7, I preferably extend it substantially
40 the full length of the mining machine and in order not to interfere with the cutter bar 2 when in depending relation, I may provide in the shoe 7 a recess 14. To promote ease of traction, the ends of the shoe are preferably
45 angled at each end 15. While any suitable traversing or feeding mechanism may be used, I have found it advantageous to use flexible feeding means typified by the chain 16 which preferably engages guiding means
50 on the support as the sheaves 17, 18 and 19, and also preferably engaging a rotary feeding element on the machine typified by the sprocket 20 and guiding means on the machine which may comprise the sheaves 21
55 and 22. In this connection guiding means is used as meaning guiding means for the chain and not as guiding means for the apparatus as a whole to determine its direction of traverse. The motor which actuates
60 the cutter chain and the feed operating member 20 is arranged between the same. The feeding sprocket 20 may be driven at variable speed and in reverse directions as usual in such machines and described in the patent
above referred to.

The apparatus preferably operates with the cutter bar at the rear and preferably with the cutter bar depending in to the coal at or near a right angle. It will be noted that the weight of the machine holds
70 the cutter bar up to the work while the flexible feeding element or other feeding means feeds the cutter bar 2 and its cutter chain 3 into the work. The preferred construction providing the sliding shoe 7 is
75 peculiarly advantageous since it not only enables the machine to be located relatively near to the ground but exerts no tendency to deflect the apparatus from its course as determined by the position of the fixed anchorage
80 point of the flexible feeding means, the point of engagement of the flexible feeding means with the apparatus and the plane of the cutter bar 2.

I preferably locate the operative engagement point of the feeding means substantially in the plane of the cutter bar. This
85 tends to keep the apparatus moving in a straight line towards the anchorage point thus avoiding cramping of the cutter bar.

Any suitable method of making the initial
90 cut may be used but I prefer to direct the machine with its longitudinal axis in the direction of the kerf to be cut with the cutter bar resting on the surface as shown in Fig.
95 6 and to feed the cutter bar into the work by downward swinging movement. I may conveniently effect this purpose, as shown in Fig. 6, by attaching the flexible feeding means 16 to a chain anchoring flange 2* cutter
100 bar 2 and tensioning the feeding means by driving sprocket 20 at a predetermined slow or cutting speed thus pulling the cutter bar into the work. I then preferably lock the cutter bar in fixed relation to the machine
105 in the position shown in dotted lines in Fig. 6, reeving the feeding means as shown in Fig. 2. The mining machine is then again started. The cutter chain preferably cuts in draw cut relation and thus removes to a great
110 extent the cuttings from the kerf. The rotation of the sprocket 20 by the actuation of the mining machine causes the apparatus to pull itself toward the fixed anchorage point. If it is desired to make a slightly shallower
115 kerf, the hand wheel 11' may be screwed down, thus raising the pivot 4 and moving the cutter bar to the position of the cutter bar 2 shown in dotted lines at the right in Fig. 2. If a deeper cut is desired the hand
120 wheel 11' may be screwed up, in which case the mining machine 1 will be tilted so that the cutter bar pivot is lowered and the bar 2 assumes the position shown in dotted lines at the left in Figure 2. When a sulphur
125 ball or other obstruction is encountered the machine may cut beneath it to some extent by angling the machine 1 as a whole and may cut across the top or be drawn thereover with a minimum of cutting by releasing the bar
130

from its locked position. It will be understood that the position of the cutter bar with respect to the coal to be cut may be adjusted to any desired angle and by suitable adjustment the cutter bar 2 may be made to extend perpendicular to the top surface of the coal, if this be found desirable, irrespective of whether the mining machine is tilted so as to make a maximum or a minimum cut. This double adjustment permits the employment of the most desirable angle of cutter bar irrespective of the depth within the range of the machine's capacity.

Where a considerable change in depth of cut is consistently required a longer or shorter cutter bar should be provided, but where it is desired to cut a kerf of considerably less depth the cutter bar may be temporarily fixed at a 45° or any other desired angle relative to the mining machine. In such case the cutter bar should preferably extend rearwardly in a position intermediate the two positions illustrated in Fig. 6.

Obviously, withdrawal of the cutter bar from the kerf is accomplished by reversing the chain connection and arrangement shown in Fig. 6, thus permitting the cutter bar to be swung upwardly at preferably a faster speed.

While I have illustrated and described in detail one embodiment of a preferred construction of my invention, it is to be understood that the invention is not limited to the specific elements, nor combinations of elements, nor relative arrangement of elements herein described, but that extensive deviations, omissions, substitutions and rearrangements may be made without departing from the principles thereof.

The scope of my invention is more particularly pointed out in the appended claims.

Having thus described my invention, what I claim and desire by Letters Patent to procure, is:—

1. A mining machine having a portable base and an angularly adjustable elongated cutter bar mounted for swinging movement in a vertical plane extending longitudinally of the base and between the sides of the latter and provided with cutting elements arranged to cut a kerf to admit said bar, and means to increase the cutting range of said machine in the plane of swinging movement of said cutter bar comprising an adjustable pivotal mounting for said machine on its base.

2. A mining machine provided with a portable base and having cutting mechanism including an angularly adjustable elongated cutter bar swingable in a vertical plane and provided with cutting elements arranged to cut a kerf to admit said bar, and means for increasing the cutting range of said machine in the plane of movement of said cutter bar

comprising a horizontal pivot-mounting for said machine as a whole directly on said base, said machine being so positioned relative to said base as to lie directly above said base.

3. A mining machine having a portable base, a horizontal pivotal mounting for said machine on said base, said machine being so disposed relative to said base that its vertical projection on said base falls entirely between the sides of said base, and an elongated pivoted cutter bar on said machine swingable on a parallel axis and in a vertical plane parallel to a line parallel to the longitudinal axis of said base and lying within the lateral limits of the latter, said cutter bar carrying orbitally moving bits arranged to cut a kerf to admit said bar while said bar is fed bodily at uniform speed and in a fixed angular relation to its path of feed.

4. A mining machine provided with a portable base and having cutting mechanism including an elongated cutter bar swinging through a vertical plane and complete self-contained actuating means for said cutting mechanism, and means to vary the cutting range of said machine in the plane of movement of said cutter bar comprising a pivoted mounting for said machine directly on said base whereby said machine lies directly above said base, said cutter bar carrying orbitally moving bits arranged to cut a kerf to admit said bar when said bar is fed bodily at uniform speed and in a fixed angular relation to its path of feed, and adjusting means for effecting adjustment on said pivot.

5. In combination with a mining machine including a plane cutter bar pivotally mounted thereon and having a circulating cutting element carrying cutter chain circulating in an orbit around the edges thereof, said bar pivot lying inside said orbit, power supplying means, and power rotated means for effecting bodily feeding of said machine as a whole during cutting, a portable base, and a pivotal mounting whereby said machine is supported for tilting movement as a whole in a vertical plane on said base, said cutter bar also being swingable in a vertical plane to cut a kerf.

6. A mining machine having a horizontally pivoted elongated cutter bar adapted to cut a kerf when the machine is moved bodily as a whole during cutting and the cutter bar disposed in fixed angular relation to its path of feed, and power actuated means for swinging said bar and bodily moving the machine, a portable base for said machine, and means to vary the depth of cut in the plane of swing of the cutter bar comprising an adjustable pivotal mounting for said machine as a whole on said base, said bar being disposable with its free end more remote

than its pivotal axis from the pivotal axis of the machine as a whole.

7. A mining machine having a horizontally pivoted cutter bar having cutting elements adapted to cut a kerf on edgewise presentation of said bar to the work and power means whereby said machine may be fed bodily as a whole during cutting or said cutter bar may be swung relative to said machine, a portable base for said machine, and means to vary the depth of cut in the plane of the swing of the cutter bar comprising an adjustable pivotal mounting for said machine as a whole on said base, said bar mounting permitting said bar to be disposed with its free end more remote than its pivotal axis from the pivotal axis of the machine as a whole.

8. A mining apparatus comprising, in combination, a portable base, a mining machine pivotally mounted directly thereon and vertically above the same for pivotal movement in a single plane and comprising a prime mover, a cutter bar pivotally mounted on said mining machine and having cutting elements driven by said prime mover and traveling in an orbit whose plane makes an angle with a horizontal plane, the pivotal axis of said bar being surrounded by said orbit, and means to vary the angular position of the mining machine as a whole with respect to its base to vary the depth of the cut in the plane of movement of the cutter bar.

9. A mining apparatus comprising, in combination, a portable base, a mining machine pivotally mounted directly thereon and vertically above the same for pivotal movement in a single plane and comprising a prime mover, a cutter bar pivotally mounted on said mining machine and having cutting elements driven by said prime mover and traveling in an orbit whose plane makes an angle with a horizontal plane, said cutting elements being arranged to cut a kerf to admit the bar on proper presentation of the latter to the work to an extent such that more than one-half of said orbit may lie within the kerf, and means to vary the angular position of the mining machine as a whole with respect to its base and of the cutter bar with respect to said machine, to vary the depth of the cut in the plane of movement of the cutter bar.

10. In a mining apparatus, in combination, a skid, a mining machine mounted for angular adjustment on said skid and including kerf cutting mechanism arranged to cut a vertical kerf and feeding mechanism operative to effect feed of said skid and said machine, said feeding mechanism including a feed operating member directly engageable with flexible feeding means, and means for adjusting said machine angularly relative to said skid.

11. In a mining apparatus, in combination, a skid, a mining machine mounted for angular adjustment on said skid and including kerf cutting mechanism arranged to cut a vertical kerf and feeding mechanism operative to effect feeding movement of said skid and machine, said feeding mechanism including a feed operating member directly engageable with flexible feeding means, and means for holding said machine in adjusted angular position on said skid.

12. In a mining apparatus, in combination, a portable base, a mining machine mounted on said base for angular adjustment about a transverse axis and including machine feeding mechanism and vertically disposed horizontally pivoted kerf cutting mechanism, said feeding mechanism including a feed operating member directly engageable with flexible feeding means, and means for adjusting said machine angularly as a whole relative to said base.

13. In a mining apparatus, in combination, a portable base, a mining machine mounted thereon and including means for effecting bodily feeding movement of said apparatus during cutting and a plane cutter bar disposed at an angle relative to said machine and arranged to cut a vertical kerf, said feeding means including a feed operating member adapted to cooperate directly with flexible feeding means during feeding, and power means for adjusting said machine during cutting angularly as a whole relative to said base in a vertical plane.

14. In a mining apparatus, in combination, a portable base, a mining machine mounted on and vertically above the same and including means for effecting feeding movement of said apparatus during cutting and a swinging plane cutter bar disposed at an angle relative to said machine and arranged to cut a vertical kerf, said feeding means including a feed operating member directly engageable with flexible feeding means, and power means for adjusting said machine angularly during cutting relative to said base in a vertical plane.

15. In a mining apparatus, in combination, a portable base, a mining machine including machine feeding mechanism and a cutter bar mounted to swing in a vertical plane to cut a vertical kerf, said feeding mechanism including a feed operating member directly engageable with flexible feeding means, and means for adjusting said machine angularly in a parallel vertical plane relative to said base.

16. In a mining apparatus, in combination, a skid, a mining machine pivoted thereon upon a horizontal pivot and including kerf cutting mechanism arranged to cut a vertical kerf and feeding mechanism operative to effect feeding movement of said skid and machine, said feeding mechanism

including a feed operating member directly engageable with flexible feeding means, and means for adjusting said machine in a vertical plane about its pivot on said skid.

17. In a mining apparatus, in combination, a portable base, a mining machine pivoted thereon on a horizontal axis and including machine feeding mechanism and pivotally connected kerf cutting mechanism connectable with said feeding mechanism and arranged to cut a vertical kerf, said feeding mechanism including a feed operating member directly engageable with flexible feeding means, and means for adjusting said machine about its pivot.

18. In a mining apparatus, in combination, a skid, a mining machine pivoted thereon and including kerf cutting mechanism arranged to cut a vertical kerf and feeding mechanism operable to effect feeding movement of said skid and machine, said feeding mechanism including a feed operating member directly engageable with flexible feeding means, and means for adjusting said machine in a plane substantially at right angles to the plane of movement of said skid.

19. In a mining apparatus, in combination, a skid, a mining machine pivoted thereon for angular movement about an axis transverse to the direction of movement of said skid, said machine including kerf cutting mechanism arranged to cut a vertical kerf and mechanism operable to effect feeding movement of said skid and machine, said last mentioned mechanism including a feed operating member adapted to cooperate directly with flexible feeding means, and means for holding said machine in adjusted angular position on said skid.

20. In a mining apparatus, in combination, a skid, a mining machine mounted for angular adjustment on said skid, said machine including kerf cutting mechanism arranged to cut a vertical kerf and feeding mechanism, flexible feeding means operatively connected to said feeding mechanism and leading to a fixed support in advance of the machine, and means for adjusting said machine angularly relative to said skid and for holding the same in adjusted position.

21. Mining apparatus comprising, in combination, the skid 7, the mining machine 1 supported solely by said skid, the pivotal support 9 and the substantially vertically depending cutter bar 2 provided with cutting elements adapted to cut a kerf in the material supporting said apparatus to admit said bar, and means for swinging said mining machine as a whole on said pivotal support to vary the distance between the bottom of said skid and the bottom of said cutter bar.

22. Mining apparatus comprising, in combination, the skid 7, the mining machine

1 supported solely by said skid, the pivotal support 9 and the substantially vertically depending cutter bar 2 having circulating cutting elements moving upward on the side of said bar toward said machine and operative to cut a kerf to receive said bar, and manually operable means for swinging said mining machine as a whole on said pivotal support to vary the distance between the bottom of said skid and the bottom of said cutter bar.

23. Mining apparatus comprising, in combination, the skid 7, the mining machine 1 having the cutter bar 2 adjustable with respect thereto, said cutter bar being provided with cutting elements arranged to cut a kerf to admit the bar, the pivotal support 9 for said machine on said skid providing a pivot for the machine arranged wholly to one side of the longitudinal center line of said skid about which said machine is pivotable in a plane making an angle with the horizontal, said pivot constituting the sole pivotal support for the machine, and means for swinging said mining machine as a whole on said pivotal support.

24. Mining apparatus comprising, in combination, the skid 7 adapted to constitute a moving support during cutting, the mining machine 1 movable bodily with said skid during cutting, the substantially vertically depending cutter bar 2 having orbitally moving cutting elements arranged to cut a kerf to receive the bar, the pivotal support 4 disposed within the orbit of the cutting elements about which said cutter bar may be swung, the pivotal support 9, releasable locking means 5 to prevent swinging movement of said cutter bar about said pivotal support, and mechanism for swinging said mining machine about said pivotal support to vary the distance between the bottom of said skid and the bottom of said cutter bar.

25. In a mining apparatus, in combination, a skid having an extended supporting surface slidable over the surface to be mined and having an upstanding portion, a mining machine of a type slidable upon a surface thereof over a mine bottom during cutting pivoted at a point intermediate its ends on a transverse axis on said portion and having cutting mechanism adapted to cut a vertical kerf, and means connected between said mining machine and support for adjusting the angular position of said mining machine to vary the relative position of said cutting mechanism and the mine surface.

26. In a mining apparatus, in combination, a skid slidable over the surface to be mined and having an upstanding portion, a mining machine of a type slidable on a surface thereof over a mine bottom during cutting pivoted at a point intermediate its ends on

a transverse axis on said upstanding portion and having cutting mechanism movable to cut a vertical kerf, and adjustable means pivotally connected to both said support and said machine for adjusting the latter about its pivot to vary the relative position of said cutting mechanism and the mine surface.

27. In a mining apparatus, in combination, a skid having an upstanding portion thereon, a mining machine of a type slidable on a surface thereof over a mine bottom during cutting pivoted at a point intermediate its ends on a horizontal pivot on said upstanding portion and having cutting mechanism adapted to cut a vertical kerf, flexible feeding mechanism operatively connected to said mining machine, and means adjustable at will to vary the depth of the kerf cut by said cutting mechanism.

28. In a mining apparatus, in combination, a skid movable over the surface of the material to be mined, a mining machine of a type slidable on a surface thereof over a mine bottom during cutting pivoted thereon on a transverse axis, cutting mechanism pivotally connected to said mining machine and driven thereby movable to cut a vertical kerf in the stratum beneath said support, feeding mechanism carried by said mining machine and driven thereby, and flexible feeding means operatively connected to said feeding mechanism and leading to a fixed support in advance of the machine.

29. In a mining apparatus, in combination, a skid movable over the surface of the material to be mined, a mining machine of a type slidable on a surface thereof over a mine bottom during cutting pivoted thereon on a transverse axis, cutting mechanism pivotally connected to said machine on a transverse pivot and driven thereby, said cutting mechanism comprising a cutter bar provided with orbitally moving cutting elements arranged to cut a kerf to receive said bar, feeding mechanism carried by said mining machine and driven thereby, and flexible means operatively connectible to said feeding mechanism and to said cutting mechanism.

30. In a mining apparatus, in combination, a support slidable over the surface to be mined and having a cut-away portion at one of its ends, a mining machine carried on said support, cutting mechanism including a cutter bar carried by said machine and pivoted thereon on a horizontal pivot, said cutting mechanism being adapted to cut a kerf to receive said bar upon bodily movement of the apparatus, and means for swinging said cutting mechanism as a whole about its pivot from a longitudinally disposed position to a position within said cut-away portion.

31. In a mining apparatus, in combination,

a shoe having a longitudinally disposed upstanding portion, a mining machine of a type slidable on a surface thereof over a mine bottom during cutting pivoted at a point intermediate its ends on said upstanding portion and disposed over said shoe, cutting mechanism pivotally connected to one end of said mining machine, and means operatively connected to said mining machine for varying the angle of the same relative to said shoe.

32. In a mining apparatus, in combination, a shoe having a longitudinally disposed upstanding portion, a mining machine of a type slidable on a surface thereof over a mine bottom during cutting pivoted at a point intermediate its ends on said upstanding portion and disposed over said shoe cutting mechanism pivotally connected to one end of said mining machine, and means operatively connected to the other end thereof for adjusting the angle of the same relative to said shoe.

33. In a mining apparatus, in combination, a shoe having a longitudinally disposed upstanding portion, a mining machine pivoted at a point intermediate its ends on said upstanding portion and disposed over said shoe, cutting mechanism pivotally connected to one end of said mining machine and comprising a pivoted cutter bar provided with circulating cutting elements arranged to cut a kerf to admit the bar, means operatively connected to the other end thereof for adjusting the angle of the same relative to said shoe, and means including a flexible connection operatively connectible to said mining machine for propelling the same or for adjusting said cutting mechanism about its pivot.

34. In a mining apparatus, a portable base movable bodily rectilinearly during the cutting of a kerf, a plane kerf cutter comprising an elongated cutter bar and cutting elements operative to cut along the full length of said bar a vertical kerf of a width to receive said bar parallel to a plane parallel to the direction of rectilinear movement of said base and between the sides of the latter, and means for varying the vertical dimension of the kerf cut in a given plane including means for supporting said cutter on said base comprising a plurality of adjustable pivots.

35. In a mining apparatus, a portable base movable bodily rectilinearly during the cutting of a kerf, an elongated plane kerf cutter comprising a cutter bar and cutting elements orbitally movable about the margin of said bar operative to cut a vertical kerf of a width to receive said bar parallel to a plane parallel to the direction of rectilinear movement of said base and between the sides of the latter, and means for varying the vertical dimension of the kerf cut including means

for supporting said cutter on said base comprising a plurality of adjustable parallel pivots.

36. In a mining apparatus, a portable base movable bodily rectilinearly during the cutting of a kerf, a plane kerf cutter comprising an elongated cutter bar provided with circulating cutting elements operative to cut along the full length of said bar a plane vertical kerf of a width to receive said bar and parallel to the direction of rectilinear movement of said base and between the sides of the latter, and means for varying the vertical dimension of the kerf cut in a single plane including means for supporting said cutter on said base comprising a plurality of independently adjustable pivots.

37. In a mining apparatus, a portable base movable bodily rectilinearly during the cutting of a kerf, an elongated plane kerf cutter comprising a cutter bar provided with circulating cutting elements movable in an orbit about the margin of said bar operative to cut a plane vertical kerf of a width to receive said bar and parallel to the direction of rectilinear movement of said base and between the sides of the latter, and means for varying the vertical dimension of the kerf cut including means for supporting said cutter on said base including a plurality of independently adjustable parallel pivots.

38. In a mining apparatus, a portable base constituting the sole support for the apparatus, a mining machine including machine feeding mechanism and vertically disposed plane kerf cutting mechanism including an elongated cutter bar having cutting elements movable orbitally about its margin and adapted to cut a kerf to admit said bar, said machine feeding mechanism being located entirely within the plane of said kerf cutting mechanism.

39. In a mining apparatus, a mining machine having machine feeding mechanism and kerf cutting mechanism normally cutting with the lateral edge thereof, said machine being normally slidable on its own bottom upon the mine bottom during cutting and cutting laterally in a horizontal plane, and means for mounting said machine with said kerf cutting mechanism in a vertical plane for cutting a vertical kerf and constituting a sliding support for the same.

40. In a mining apparatus, a mining machine having machine feeding mechanism and angularly adjustable kerf cutting mechanism and normally cutting in a horizontal plane, and a support comprising means for mounting the machine with the kerf cutting mechanism in a vertical plane.

41. In a mining apparatus, a mining machine having machine feeding mechanism for bodily moving the apparatus during cutting, and a cutter bar disposed at an angle relative to said machine and having cutting

elements movable orbitally about its margin, and a support providing means for mounting said machine at will with the cutter bar lying within a vertical plane.

42. In a mining apparatus, a portable base, a mining machine normally cutting on its bottom and including machine feeding mechanism and a swinging cutter bar, and means for operating said machine on said base and with its bottom in a vertical plane.

43. In a mining apparatus, in combination, a portable base having a single longitudinally disposed upstanding portion mounted thereon, a mining machine pivoted at a point intermediate its ends on a transverse axis on said upstanding portion and disposed on said base, the width of the base on the side of the upstanding portion immediately below said machine being greater than on the opposite side.

44. In a mining apparatus, in combination, a shoe having a single longitudinally disposed upstanding portion mounted thereon arranged at one side of the center line of said shoe, and a mining machine pivoted on said upstanding portion on a transverse axis, said machine overlying the wider portion of said shoe.

45. In a mining apparatus, in combination, a shoe having a longitudinally disposed upstanding portion mounted thereon arranged at one side of its central line, and a mining machine having a cutter bar and pivoted solely at one side thereof on said upstanding portion with its cutter bar lying in a vertical plane and projecting across said central line.

46. In a mining apparatus, a portable base, a mining machine including machine feeding means operative to effect movement of translation of said machine and base during cutting and a cutter bar, said machine being pivoted at about its center of balance on a horizontal relatively fixed pivot upon said base, and means for adjusting said machine about its pivot.

47. A mining machine having a portable base and a cutter bar swingable through a vertical plane extending longitudinally of and substantially centrally of said base, said cutter bar having cutting elements thereon movable orbitally about its margin and arranged to cut a kerf along the length of the bar and to admit said bar upon bodily movement of the machine, and means to increase the cutting range of said machine in the plane of movement of said cutter bar comprising a pivotal mounting on its base and means for swinging said machine about said pivot.

48. A mining machine comprising machine feeding mechanism and a swinging cutter bar, said cutter bar having cutting elements thereon arranged to cut a kerf to

admit said bar, means for supporting the same with its cutter bar pivoted to swing in a vertical plane, said supporting means having an opening through which said bar is adapted to swing in making a vertical cut.

49. A mining machine having a horizontally pivoted cutter bar, said bar provided with cutting elements arranged to cut a kerf to admit said bar, a portable base for said machine, said bar being disposable in a position making an angle with the horizontal in a vertical plane extending longitudinally of and substantially midway between the sides of said base, and means to vary the depth of cut comprising an adjustable pivotal mounting, parallel to said first mentioned pivot, for said machine on said base.

50. A mining machine having a horizontally pivoted cutter bar, said bar provided with cutting elements arranged to cut a kerf to admit said bar, means including supporting means for said machine whereby the latter may be moved toward and from the working face in a rectilinear path, and means to vary the depth of cut in the plane of movement of said cutter bar about its pivot comprising a mounting for said machine on said supporting means on a pivot extending transversely of the direction of rectilinear movement of the machine, said cutter bar being disposed in a vertical plane parallel to the direction of feed and substantially midway between the sides of said supporting means.

51. A mining machine having machine feeding mechanism for bodily moving the machine during cutting and a horizontally pivoted cutter bar having cutters movable orbitally about its margin, and means by which the machine may be supported during movement relative to the work, said supporting means having an opening through which said bar may be swung in making a vertical cut, said bar when horizontal lying wholly above the planes of said opening.

52. In a mining apparatus, in combination, a portable base, a mining machine pivoted thereon and including machine feeding mechanism and pivotally connected kerf cutting mechanism, said kerf cutting mechanism comprising a cutter bar swingable in a vertical plane and having orbitally moving kerf cutting elements arranged to cut a vertical kerf to admit said bar and said machine feeding mechanism being connectible to said kerf cutting mechanism to cause swinging movement thereof, and means for adjusting said machine about its pivot.

53. In a mining apparatus, in combination, a portable base, a mining machine mounted for pivotal movement with respect thereto and including machine feeding mechanism operative to feed said machine during the cutting of a plane kerf, and plane kerf cutting mechanism, said kerf cutting mechanism

comprising a cutter bar swingable in a vertical plane and having orbitally moving kerf cutting elements arranged to cut a vertical kerf to admit said bar and said machine feeding mechanism being connectible to cause a swinging movement of said kerf cutting mechanism relative to said base.

54. In a mining apparatus, in combination, a portable base, a mining machine mounted for pivotal movement with respect thereto, a cutter bar on said machine, cutting elements on said cutter bar arranged to cut a kerf in a vertical plane to admit said bar, machine feeding mechanism on said machine, and means whereby said feeding mechanism may be connected to cause said cutter bar to swing relatively to said base in a vertical plane.

55. In a mining apparatus adapted for the cutting of vertical kerfs, a portable base, a mining machine pivoted thereon and having an elongated cutter bar adapted to move in a vertical plane upon movement of said machine about its pivot, said bar provided with cutting elements arranged to cut a kerf to receive said bar, and feeding means for said machine and base including a rotatable sprocket member whose position relative to said base is changed in a vertical plane by movement of said machine about its pivot adapted for connection to cause said machine to cut a vertical kerf.

56. In a mining apparatus, a machine supporting base rectilinearly movable during cutting, a machine supported thereon, an elongated cutter bar pivotally mounted on said machine and operative to cut a substantially vertical kerf parallel to the direction of movement of said base and between the sides of the latter, said bar provided with cutting elements arranged to cut a kerf to receive said bar, and a pivotal connection between said machine and base on which said machine may be adjusted as a whole to effect bodily movement of said cutter bar in its plane of cut.

57. In a mining apparatus, a support, a mining machine thereon arranged to move bodily therewith during cutting, a cutter bar having cutters movable orbitally about its margin pivoted on said machine and swingable in a vertical plane to cut the plane of said support within the area between the sides of said support and at a point between the extreme longitudinal limits thereof, said bar in another position extending substantially beyond the limits of said support.

58. In a mining apparatus, in combination, a portable base having a longitudinally disposed upstanding portion, a mining machine pivotable about a transverse axis lying between its ends and journaled for such pivotal movement solely on said upstanding portion, the width of the base on the side of the upstanding portion immediately below said

machine being greater than that of the opposite side of said upstanding portion so that it underlies the machine.

59. In a mining apparatus, in combination, a shoe having a longitudinally disposed upstanding portion arranged at one side of the center line of said shoe, and a mining machine having at one side only thereof a projecting element constituting a pivot and supported by said upstanding portion where-
10 by said machine may be tilted about a transverse axis, said machine overlying the wider portion of said shoe which underlies the machine for substantially its full width.

15 60. In a mining apparatus, in combination, a portable base, a mining machine movable with said base and overlying the same, supporting means arranged wholly at one side of said mining machine and including
20 an upstanding portion disposed on said base, and cooperating means carried by said machine for pivotally supporting the latter for tilting movement about a transverse axis.

25 61. In a mining apparatus, a portable base, a mining machine normally cutting on its own bottom and including machine feeding mechanism and a cutter bar, and means for operating said machine on said base and with its bottom in a vertical plane.

30 62. In a mining apparatus, in combination, a mining machine having a frame presenting a plane surface upon which said machine is adapted to be disposed and a pivoted cutter bar, and supporting means for
35 said machine comprising a skid underlying the same and a support on said skid against which said surface is disposed during operation of the cutter bar to bring said cutter bar into a plane at a substantial angle to
40 its plane when cutting on the bottom.

45 63. In a mining apparatus, the combination with a mining machine normally slidable on its own bottom on the mine bottom during cutting and having a horizontally
movable cutter bar cutting with the lateral edge thereof, of means for operating said machine with its bottom in a vertical plane comprising a skid on which said machine is
50 supported on its side and with which said machine is slidable over the mine bottom during cutting.

55 64. In a mining apparatus, in combination, a mining machine slidable on the mine bottom and having a body presenting a plurality of plane surfaces, and means for operating said machine when selectively supported with different surfaces constituting
its under side.

60 65. In a mining apparatus, the combination with a mining machine normally slidable on its own bottom and having a pivoted cutter bar, of means including an auxiliary support for operating said machine with its bottom in a vertical plane and with its cutter
65 bar swingable in a vertical plane.

66. In a mining apparatus, a machine body comprising machine feeding mechanism, angularly adjustable kerf cutting mechanism normally cutting in a horizontal plane, and means including an auxiliary
70 support permitting operation of said feeding mechanism with the kerf cutting mechanism positioned to cut in a vertical plane beneath the level of the machine body.

67. In a mining apparatus, a machine
75 body comprising machine feeding mechanism including a flexible tractive connection for bodily moving the apparatus during cutting, angularly adjustable kerf cutting mechanism normally cutting in a horizontal plane
80 and comprising a cutter bar having cutters movable orbitally about its margin, and supplementary supporting means permitting employment of said tractive connection with the kerf cutting mechanism positioned to
85 cut in a vertical plane beneath the level of the machine body.

68. In a mining machine, a portable base, a mining machine body pivoted on a horizontal axis to said base, cutting mechanism
90 disposed between the sides of said base and connected to said body for angular adjustment with respect thereto, said cutting mechanism including a bar provided with orbitally moving elements arranged to cut a
95 kerf to admit said bar, means actuated by power from the mining machine for effecting angular adjustment of the cutting mechanism, and simultaneously operable means for effecting angular adjustment of the machine body with respect to the base during
100 cutting.

69. In a mining machine, a portable base, a mining machine pivoted on a horizontal axis to said base, cutting mechanism
105 disposed between the sides of said base and pivoted to the machine on an axis parallel to that of the machine, said cutting mechanism including a bar provided with orbitally moving elements arranged to cut a kerf to admit
110 said bar, means actuated by power from the mining machine for effecting movement of the cutting mechanism on its pivot, and simultaneously operable means for similarly adjusting the machine, thereby increasing
115 the range of angular movement of the cutting mechanism.

70. In a mining apparatus, in combination, a support, a mining machine pivoted thereto for angular movement about an axis transverse to the direction of movement of the support, said machine including a single pivotally mounted kerf cutting bar positioned to cut in a vertical plane and having a free end movable to opposite sides of a line parallel to the mine bottom while more remote than its pivot from the axis of machine pivotal movement, means operable to effect feeding movement of the apparatus, and
120 means for swinging said machine about its
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pivot to the support comprising an extensible and retractable connection between the support and machine.

71. In a mining apparatus, in combination, a support, a mining machine pivoted thereto for angular movement about an axis transverse to the direction of movement of the support, said machine including means operable to effect feeding movement of the apparatus and a single pivotally mounted kerf cutting bar projecting in a plane parallel to the direction of rectilinear movement of said support and having a free end movable to opposite sides of a plane parallel to the mine bottom while more remote than its pivot from the axis of machine pivotal movement, and means for swinging said machine and cutting means about the pivot of the machine to the support comprising complementary relatively movable coaxial threaded members on the support and machine.

72. A mining machine comprising, in combination, plane kerf cutting mechanism arranged to cut kerfs in vertical planes and comprising a cutter bar about whose periphery cutting elements are orbitally movable, a supporting means adapted for motion of translation during cutting, said bar being carried on said supporting means and pivotable relative thereto about a pivot perpendicular to its plane of cut and surrounded by the orbit of said cutting elements and so disposed that the plane of cut substantially coincides with the central longitudinal vertical plane of said supporting means, and feeding means including power winding means carried by said supporting means and an element connectible during cutting from a point in advance of said machine to said power winding means.

73. A mining machine comprising, in combination, plane kerf cutting mechanism adapted to cut kerfs in vertical planes and comprising a cutter bar about whose periphery cutting elements are orbitally movable, a supporting means adapted for motion of translation during cutting, said bar being carried on said supporting means and pivotable relative thereto about a pivot perpendicular to its plane of cut and within the orbit of said cutting elements and said bar being so disposed relative to said supporting means that the kerf cut lies in a vertical plane substantially midway between the sides of the path traversed by said supporting means during cutting, and motor driven means on said supporting means for actuating said cutter bar and for effecting feed of said supporting means.

74. In a mining apparatus, in combination, a portable base movable rectilinearly during cutting and including a prime mover, an elongated plane kerf cutter comprising a bar mounted to swing on said base about a horizontal axis and extending in a plane

parallel to the direction of movement of said base and between the sides thereof, said bar having thereon cutting means arranged to cut a kerf to admit said bar, means for swinging the cutter bar and for causing travel of the apparatus by power from said prime mover, and means for adjusting the cutter bar axis vertically while maintaining the cutter bar in a plane parallel to the longitudinal axis of the base comprising means permitting pivotal adjustment between sections of the base about a horizontal axis extending transversely of the base when the cutter bar is in said plane, said axis being spaced longitudinally of said apparatus from the cutter bar axis.

75. In a mining apparatus, in combination, a portable base movable rectilinearly during cutting and including a prime mover, a plane kerf cutter comprising a bar mounted to swing on said base about a horizontal axis and extending in a plane parallel to the direction of movement of said base and between the sides thereof, said bar supporting circulating cutting elements moving in an orbit surrounding said axis, means for adjusting the cutter bar axis vertically, while maintaining the cutter bar in a plane parallel to the longitudinal axis of the base, comprising means permitting pivotal adjustment between sections of the base about a horizontal axis extending transversely of the base when the cutter bar is in said plane, said axis being spaced longitudinally from the cutter bar axis, and means for swinging the cutter bar in opposite directions by power from said prime mover at predetermined differing rates of speed.

76. In a mining apparatus, in combination, a portable base comprising a transport section and a cutter carrying section pivoted to the transport section on a horizontal axis, an elongated cutter bar pivotally connected to said carrying section on a second horizontal axis, said bar having thereon cutting means movable in an orbit about the margin thereof and arranged to cut a kerf to admit said bar and said axes being in fixed parallel relation, means for holding said cutter bar in adjusted angular relation with said carrying section, means for propelling said portable base to secure feeding movement of the cutter bar with the base section and cutter bar in such fixed angular positions, means for adjusting said carrying section during operation of the cutter bar, and means for actuating the cutter bar.

77. In a mining apparatus, in combination, a portable base comprising a transport section and a cutter carrying section pivoted to the transport section on a horizontal axis, an elongated plane cutter bar connected to said carrying section on a second horizontal axis, said bar being provided with circulating cutting elements movable in an orbit

about the margin thereof and arranged to cut a kerf to admit said bar and said axes being in fixed parallel relation, and means for causing vertical movement of said cutter bar comprising means for swinging the carrying section on its pivot to the transport section and for simultaneously causing movement of the cutter bar on its pivot to the carrying section.

78. In a mining apparatus, in combination, a portable base comprising a transport section and a cutter carrying section pivoted to the transport section on a horizontal axis, an elongated plane cutter bar pivotally connected to said carrying section for swinging on a second and parallel horizontal axis, said bar being provided with a circulating cutter chain carrying cutting elements moving in an orbit within which said second axis passes, said axes being in fixed parallel relation, and means for causing vertical movement of said cutter bar comprising power transmitting elements on the cutter carrying section.

79. In a mining apparatus, in combination, a portable base comprising a transport section and a cutter carrying section pivoted to the transport section on a horizontal axis, an elongated cutter bar connected to said carrying section on a second and parallel horizontal axis and provided with a circulating cutter chain carrying cutting elements whose orbit surrounds said second horizontal axis, means for adjusting said cutter carrying section on its pivot while maintaining said horizontal axes parallel, means for holding said cutter bar rigid relatively to said carrying frame at different vertical adjustments thereof, and power transmitting means on the carrying section for swinging the cutter bar relatively to said carrying section including means permitting free swinging of said bar.

80. In a mining apparatus, in combination, a machine body including a prime mover, transportable supporting means for the body, an elongated cutter bar pivoted to the body on a horizontal axis and provided with cutting elements arranged to cut a kerf to admit said bar, and means for swinging said cutter bar in a vertical plane parallel to the longitudinal axis of the body comprising an operating connection between the prime mover and the cutter bar including means for swinging said bar in opposite directions at different predetermined speeds.

81. In a mining apparatus, in combination, a machine body including a prime mover, transportable supporting means for the body, an elongated cutter bar pivoted to the body on a horizontal axis and provided with cutting elements arranged to cut a kerf to admit said bar, means for swinging said cutter bar by power from said prime

mover at a predetermined slow or cutting speed to a position in angular relation to the longitudinal axis of the body to form a vertical kerf, and means for thereafter returning said bar at higher than cutting speed.

82. In a mining apparatus, in combination, a portable base movable rectilinearly, a machine body on said base including a prime mover, an elongated cutter bar pivoted to the body on a horizontal axis and provided with circulating cutting elements arranged to cut a kerf to receive said bar, means for swinging said bar by power from said prime mover at a predetermined slow or cutting speed to a position in angular relation to the longitudinal axis of the body to form a vertical kerf, means actuated by the prime mover for causing translative movement of the base while retaining the cutter bar in said position, and means for thereafter returning said bar at higher than cutting speed.

83. In a mining apparatus, in combination, a portable base, a machine body on said base including a prime mover, an elongated cutter bar mounted to swing about a horizontal axis on said base and between the sides thereof, said cutter bar provided with cutting means arranged to cut a kerf to admit said bar, means for swinging the cutter bar by power from said prime mover at a predetermined slow or cutting speed to a position in angular relation to the longitudinal axis of the body to form a vertical kerf, and means for thereafter returning said bar at higher than cutting speed said bar swinging means comprising a variably driven gear.

84. In a mining apparatus, in combination, a portable base including a machine body having a prime mover, an elongated cutter bar mounted to swing about a horizontal axis on said base and between the sides thereof, said cutter bar provided with cutting devices arranged to cut a kerf to admit said bar, means for swinging the cutter bar by power from said prime mover at a predetermined slow or cutting speed to a position in angular relation to the longitudinal axis of the body to form a vertical kerf, means for thereafter returning said bar at higher than cutting speed, and means for varying the position of the cutter bar vertically comprising means for pivotal adjustment between sections of the base on an axis in fixed parallel relation to that of the cutter bar and spaced longitudinally from the cutter bar axis.

85. A mining apparatus comprising an oblong machine body including a prime mover and a pivoted cutter bar, means for positioning the body in either of two positions about its longitudinal axis, means for swinging said cutter bar in either position of the body by power from said prime mover to cut in different planes, and means actu-

ated by said prime mover for causing travel of the machine in either position.

86. A mining apparatus comprising an oblong machine body including a prime mover and cutting mechanism driven thereby, means for positioning the body in either of two positions about its longitudinal axis to cut in different planes, and means actuated by said prime mover for causing travel
10 of the apparatus in either position.

87. A mining apparatus comprising an oblong machine body including a prime mover and cutting mechanism driven thereby, means for positioning the body in either
15 of two positions about its longitudinal axis to permit said cutting mechanism to operate in different planes, and means actuated by said prime mover for causing travel of the apparatus in either position, said means including variable speed mechanism for moving
20 the apparatus at predetermined slow or working speed or at higher transport speed.

88. The combination with a mining machine comprising an oblong body having a
25 plane bottom, said body including a prime mover and cutting mechanism driven thereby, which body is normally adapted for operation with said bottom in a certain plane, of means permitting operation of the machine with said body turned angularly about
30 its longitudinal axis to position its bottom in a different plane and to permit said cutting mechanism to operate in different planes.

89. The combination with a mining machine comprising an oblong body having a
35 plane bottom, said body including a prime mover and having cutting mechanism and machine moving mechanism driven thereby, which body is normally adapted for operation with said bottom positioned in a certain
40 plane, of means permitting operation of the machine with said body turned angularly about its longitudinal axis to position its bottom in a different plane to permit said
45 cutting mechanism to operate in different planes, and means permitting employment of said machine moving means in either position.

90. In a mining apparatus, in combination, a portable base comprising a transport section and a cutter carrying section pivoted to the transport section, an elongated cutter bar having cutting elements movable orbitally
50 about its margin to cut a kerf to admit said bar and connected to said carrying section on a second parallel pivot, said pivots being in fixed parallel relation, and means for causing vertical movement of the cutter
55 bar in the plane thereof comprising power transmitting elements on the cutter carrying section, said bar being disposable in angularly related positions in which its longitudinal axis forms the sides of an angle whose apex lies in the axis of said second pivot and
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whose sides extend from said apex away from said first mentioned pivot and make equal angles with the plane of said pivots.

91. In a mining apparatus, in combination, a portable base comprising a transport section and a cutter carrying section pivoted to the transport section and including power transmitting means, an elongated cutter bar having cutting elements movable orbitally about its margin to cut a kerf to admit said
7 bar and pivotally connected to said carrying section on a second pivot and positioned to cut a vertical kerf, said bar having a free end, said pivots being in fixed parallel relation, and said bar being disposable by
80 movement about its pivot parallel to a line parallel to the plane of said pivots and with its free end more remote than its pivot from the pivot of said carrying section, means actuated by said power transmitting means
85 for swinging the cutter bar in a vertical plane, and means for holding the cutter carrying section in angularly adjusted relation to the transport section.

92. In a mining apparatus, in combination, a portable base comprising a transport section and a cutter carrying section pivoted to the transport section and including power transmitting means, an elongated cutter bar having cutting elements movable
95 orbitally about its margin to cut a kerf to admit said bar and pivotally connected to said carrying section on a second pivot and having orbitally movable cutting mechanism positioned to cut in a vertical plane,
100 said bar having a free end, the pivots of the carrying section and cutter bar being in fixed parallel relation, and said bar being disposable by movement about its pivot parallel to a line parallel to the plane of said
105 pivots and with its free end more remote than its pivot from the pivot of said carrying section.

93. In a mining apparatus, in combination, a portable base comprising a transport section, a cutter carrying section pivoted to the transport section and including variable speed power transmitting means, an elongated cutter bar pivotally connected to said
110 carrying section on a second pivot and positioned to cut a vertical kerf, said bar supporting cutting means arranged to cut a kerf to admit said bar, said pivots being in fixed parallel relation, means comprising
115 said power transmitting means for swinging the cutter bar in a vertical plane in opposite directions at different respective speeds, and means for holding the cutter carrying section in angularly adjusted relation to the transport section.
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94. In a mining apparatus, in combination, a machine body including a prime mover, transportable supporting means for the body supporting the latter for tilting movement on a horizontal pivot, an elon-

gated cutter bar pivoted to the body on a spaced horizontal pivot and supporting cutting means arranged to cut a kerf to admit said bar, means for swinging said cutter bar by power from said prime mover to form a vertical kerf, means for tilting the machine body on its horizontal pivot to raise and lower the cutter bar pivot, and means for causing travel of the apparatus by power from said prime mover including variable speed power transmitting elements.

95. In a mining apparatus, in combination, a machine body including a prime mover, transportable supporting means for the body supporting the latter for tilting movement on a horizontal pivot, a cutter bar pivoted to the body on a non-coincident horizontal pivot and supporting cutting means arranged to cut a kerf to admit said bar, means for swinging said cutter bar by power from said prime mover to form a vertical kerf, means for tilting the machine body on its horizontal pivot to raise and lower the cutter bar pivot, and means for causing travel of the apparatus at either a predetermined slow or cutting speed or at a higher or transport speed by power from said prime mover including a variable speed driving gear.

96. In a mining apparatus, in combination, a support movable in a generally rectilinear path during cutting, cutting mechanism mounted on said support and including a body supporting a pivoted cutter bar, said body being pivoted on said support on a parallel axis for arcuate movement in planes parallel to the plane of the bar, an actuating motor for the cutter bar, and means between said support and body for changing the angle of said body to the path of movement of said support and maintaining it in different desired positions including a tension member secured at one end to said support and cooperating at a spaced point with a rotatable member on said body.

97. In a mining apparatus, in combination, a support movable in a generally rectilinear path during cutting, cutting mechanism mounted on said support and including a body supporting a pivoted cutter bar, said body being pivoted on said support on a parallel axis for arcuate movement in planes parallel to the plane of the bar, an actuating motor for the cutter bar, and means between said support and body including a member on said body and rotatable on an axis offset from the axis of pivoting of said body for changing the angle of said body to the direction of movement of said support and maintaining it in different desired positions while leaving the plane of cut unchanged.

98. In a mining apparatus in combina-

tion, a support movable in a generally rectilinear path during cutting, cutting mechanism mounted on said support and including a body supporting a pivoted cutter bar, said body being pivoted on said support on a parallel axis for arcuate movement in planes parallel to the plane of the bar, an actuating motor for the cutter bar, and means between said support and body including a rotatable member on said body at the side thereof remote from said bar pivot for changing the angle of said body to the direction of movement of said support and maintaining it in different desired positions while leaving the plane of cut unchanged.

99. In a mining apparatus, in combination, a support movable in a generally rectilinear path during cutting, cutting mechanism mounted on said support and including a body supporting a pivoted cutter bar, said body being pivoted on said support on a parallel axis for arcuate movement in planes parallel to the plane of the bar, an actuating motor for the cutter bar, means between said support and body for changing the angle of said body to the direction of movement of said support and maintaining it in different desired positions, and means for effecting feeding of said entire apparatus during cutting, including a member rotatable on a horizontal axis transverse to the path of travel during cutting and driven by said motor.

100. In a mining apparatus, in combination, a support movable in a generally rectilinear path during cutting, cutting mechanism mounted on said support and including a body supporting a pivoted cutter bar, said body being pivoted on said support on a parallel axis for arcuate movement in planes parallel to the plane of the bar, an actuating motor for the cutter bar, means between said support and body including a rotatable member on said body for changing the angle of said body to the direction of movement of said support and maintaining it in different desired positions, and means for effecting feeding of said entire apparatus during cutting including a member rotatable on a horizontal axis transverse to the path of travel during cutting and driven by said motor.

101. In a mining apparatus, in combination, a support movable in a generally rectilinear path during cutting, cutting mechanism mounted on said support and including a body supporting a pivoted cutter bar, said body being pivoted on said support on a parallel axis for arcuate movement in planes parallel to the plane of the bar, an actuating motor for the cutter bar, means between said support and body including a rotatable member on said body at the side thereof remote from said bar pivot for

changing the angle of said body to the direction of movement of said support and maintaining it in different desired positions, and means for effecting feeding of said entire apparatus during cutting including a member rotatable on a horizontal axis transverse to the path of travel during cutting and driven by said motor.

102. In a mining machine, a supporting frame movable bodily relative to the mine bottom rectilinearly during cutting, cutting mechanism thereon having a pivoted cutter bar provided with cutting elements moving in an elongated orbit within and near one end of which the pivot of said bar is disposed, means including a parallel pivot permitting said bar pivot to be disposed in different positions relative to said frame, and means whereby said bar pivot may be swung either bodily with said bar or while the latter is released for free movement relative to its pivot.

103. In a mining machine, a supporting frame movable bodily relative to the mine bottom rectilinearly during cutting, cutting mechanism thereon having a pivoted cutter bar provided with cutting elements moving in an elongated orbit within and near one end of which the pivot of said bar is disposed, means including a parallel pivot permitting said bar pivot to be disposed in different positions relative to said frame including a pivotal mounting for said cutting mechanism as a whole permitting pivotal movement thereof upon an axis parallel to the bar pivot, and means whereby said bar pivot may be swung either bodily with said bar or while the latter is released for free movement relative to its pivot.

104. In a mining machine, a supporting frame movable bodily rectilinearly relative to the bottom during cutting, cutting mechanism thereon having a pivoted cutter bar provided with cutting elements moving in an elongated orbit within and near an end of which the pivot of said bar is disposed, means including a pivotal mounting on said frame for said cutting mechanism as a whole permitting said bar pivot to assume positions at opposite sides of the plane of movement of the axis of pivotal movement of said cutting mechanism during rectilinear cutting feed, means for swinging the bar pivot, and a releasable connection operative to hold the bar in fixed relation to said cutting mechanism or when released to permit relative movement therebetween automatically upon a continued swinging movement of the pivot.

105. In a mining machine, a supporting frame movable bodily rectilinearly relative to the bottom during cutting, cutting mechanism thereon having a pivoted cutter bar provided with cutting elements moving in an elongated orbit within and near an end

of which the pivot of said bar is disposed, means including a pivotal mounting on said frame for said cutting mechanism as a whole permitting said bar pivot to assume positions at opposite sides of the plane of movement of the axis of pivotal movement of said cutting mechanism during rectilinear cutting feed, means for swinging the bar pivot, and a releasable connection operative to hold the bar in fixed relation to said cutting mechanism for swinging bodily therewith or when released to permit said pivot to be swung while the tip of the bar remains substantially stationary.

106. In a mining apparatus, a portable base movable bodily rectilinearly during the cutting of a kerf, supporting mechanism pivotally mounted thereon for swinging movement upon a horizontal axis, and cutting mechanism including a pivoted cutter bar having a mounting permitting it to swing about an axis parallel to said first mentioned axis and spaced therefrom, said bar being disposable during cutting in a plane between the sides of said base and in a position in such plane in which it makes an obtuse angle with a line perpendicular to its axis of swing and lying in a plane including both of said pivotal axes.

107. In a mining apparatus, a portable base movable bodily rectilinearly during the cutting of a kerf, supporting mechanism pivotally mounted thereon for swinging movement upon a horizontal axis, and cutting mechanism including a pivoted cutter bar swingable about an axis parallel to said first mentioned axis and spaced therefrom, said bar being mounted to permit swinging between positions in each of which its free end is at opposite sides of a vertical plane including said second axis, from said first mentioned axis, and in one of which said free end lies above and in the other lies below a plane including both axes, and means for swinging said bar permitting free movement thereof when said swinging means is inoperative.

108. In a mining apparatus, in combination, a support slidable over the surface to be mined and having a cutaway portion at one of its ends, a mining machine carried on said support, cutting mechanism carried by said machine and pivoted thereon on a horizontal axis, said bar pivot overlying said cutaway portion, and means for swinging said cutting mechanism as a whole about its pivot from a longitudinally disposed position to a position within said cutaway portion.

109. In a mining apparatus, in combination, a mining machine having a frame presenting angularly disposed plane supporting surfaces and having a cutter bar pivoted thereon, one of said plane surfaces being adapted to support said machine during hor-

horizontal cutting, and supporting means for said machine comprising a skid underlying the same, and a support on said skid against which the other of said plane supporting surfaces is disposed to enable the cutter bar to swing in a vertical plane to cut a vertical kerf.

110. In a mining apparatus, a portable support, a mining machine mounted thereon for pivotal movement upon a horizontal axis relative thereto and including a driving motor partaking of the pivotal movement of said machine, said machine also having a swingable elongated cutter bar pivotally mounted thereon having cutters driven by said motor movable orbitally about its margin to cut a kerf to admit said bar, mechanism for moving said machine about its pivot, mechanism driven by said motor for swinging said cutter bar to feed the latter into the material to be mined, and mechanism driven by said motor for bodily moving the apparatus during cutting.

111. In a mining apparatus, a portable support, a mining machine mounted thereon for tilting movement relative thereto about a horizontal pivot and having a driving motor, said machine also having a swingable elongated cutter bar having cutters driven by said motor movable orbitally about its margin to cut a kerf to admit said bar, said cutter bar being arranged to swing in a vertical plane to cut a vertical kerf, mechanism for moving said machine about its pivot, mechanism driven by said motor for swinging said cutter bar to sump the latter into the material to be mined, and mechanism driven by the motor for bodily moving the apparatus as a whole during the cutting operation to feed the cutter bar into the material being mined.

112. In a mining apparatus, a portable support, a self-contained mining machine pivotally mounted on said support for tilting movement relative thereto and having a driving motor, said machine also having an elongated pivoted cutter bar having cutters driven by said motor movable orbitally about its margin to cut a kerf to

admit said bar, said bar being arranged to swing in a vertical plane to cut a vertical kerf, mechanism for moving said machine about its pivot to vary the cutting range of said cutter bar, mechanism driven by said motor for swinging said cutter bar about its pivot, and mechanism driven by the motor for moving the apparatus as a whole during the cutting operation to feed the bar into the material being mined.

113. In a mining apparatus, a portable support, a self-contained mining machine pivotally mounted on said support for tilting movement relative thereto and having a driving motor and an elongated pivoted cutter bar adapted when said machine is operating as a self-contained machine to cut a kerf in a horizontal plane, said bar having cutters driven by said motor movable orbitally about its margin to cut a kerf to admit said bar, said support being adapted to support said machine with its cutter bar swingable in a vertical plane to cut a vertical kerf, mechanism for moving said machine about its pivot to vary the cutting range of said bar, mechanism driven by said motor for swinging said cutter bar about its pivot, and mechanism driven by said motor for moving the apparatus bodily during the cutting operation to feed the cutter bar into the material to be mined.

114. In a mining apparatus, a portable support, a unitary mining machine mounted thereon for tilting movement relative thereto about a horizontal pivot and having a motor, said machine also having a pivoted cutter bar arranged to swing in a vertical plane, mechanism for moving said machine about its pivot to vary the cutting range of said cutter bar, mechanism driven by said motor for swinging said cutter bar about its pivot to cut a vertical kerf, and mechanism driven by said motor for bodily moving the apparatus as a whole during the cutting operation to feed the cutter bar into the material being mined.

In testimony whereof, I have signed my name to this specification.

MORRIS P. HOLMES.

horizontal cutting, and supporting means for said machine comprising a skid underlying the same, and a support on said skid against which the other of said plane supporting surfaces is disposed to enable the cutter bar to swing in a vertical plane to cut a vertical kerf.

110. In a mining apparatus, a portable support, a mining machine mounted thereon for pivotal movement upon a horizontal axis relative thereto and including a driving motor partaking of the pivotal movement of said machine, said machine also having a swingable elongated cutter bar pivotally mounted thereon having cutters driven by said motor movable orbitally about its margin to cut a kerf to admit said bar, mechanism for moving said machine about its pivot, mechanism driven by said motor for swinging said cutter bar to feed the latter into the material to be mined, and mechanism driven by said motor for bodily moving the apparatus during cutting.

111. In a mining apparatus, a portable support, a mining machine mounted thereon for tilting movement relative thereto about a horizontal pivot and having a driving motor, said machine also having a swingable elongated cutter bar having cutters driven by said motor movable orbitally about its margin to cut a kerf to admit said bar, said cutter bar being arranged to swing in a vertical plane to cut a vertical kerf, mechanism for moving said machine about its pivot, mechanism driven by said motor for swinging said cutter bar to sump the latter into the material to be mined, and mechanism driven by the motor for bodily moving the apparatus as a whole during the cutting operation to feed the cutter bar into the material being mined.

112. In a mining apparatus, a portable support, a self-contained mining machine pivotally mounted on said support for tilting movement relative thereto and having a driving motor, said machine also having an elongated pivoted cutter bar having cutters driven by said motor movable orbitally about its margin to cut a kerf to

admit said bar, said bar being arranged to swing in a vertical plane to cut a vertical kerf, mechanism for moving said machine about its pivot to vary the cutting range of said cutter bar, mechanism driven by said motor for swinging said cutter bar about its pivot, and mechanism driven by the motor for moving the apparatus as a whole during the cutting operation to feed the bar into the material being mined.

113. In a mining apparatus, a portable support, a self-contained mining machine pivotally mounted on said support for tilting movement relative thereto and having a driving motor and an elongated pivoted cutter bar adapted when said machine is operating as a self-contained machine to cut a kerf in a horizontal plane, said bar having cutters driven by said motor movable orbitally about its margin to cut a kerf to admit said bar, said support being adapted to support said machine with its cutter bar swingable in a vertical plane to cut a vertical kerf, mechanism for moving said machine about its pivot to vary the cutting range of said bar, mechanism driven by said motor for swinging said cutter bar about its pivot, and mechanism driven by said motor for moving the apparatus bodily during the cutting operation to feed the cutter bar into the material to be mined.

114. In a mining apparatus, a portable support, a unitary mining machine mounted thereon for tilting movement relative thereto about a horizontal pivot and having a motor, said machine also having a pivoted cutter bar arranged to swing in a vertical plane, mechanism for moving said machine about its pivot to vary the cutting range of said cutter bar, mechanism driven by said motor for swinging said cutter bar about its pivot to cut a vertical kerf, and mechanism driven by said motor for bodily moving the apparatus as a whole during the cutting operation to feed the cutter bar into the material being mined.

In testimony whereof, I have signed my name to this specification.

MORRIS P. HOLMES.

Certificate of Correction.

Patent No. 1,635,623.

Granted July 12, 1927, to

MORRIS P. HOLMES.

It is hereby certified that error appears in the printed specification of the above-numbered patent requiring correction as follows: Page 4, line 5, claim 7, for the misspelled word "edgewsie" read *edgewise*; page 6, line 83, claim 32, after the word "shoe" insert a comma; page 7, line 64, claim 41, after the syllable "ting" strike out the comma; page 11, line 99, claim 83, after the word "speed" insert a comma; page 13, line 65, claim 98, after the word "apparatus" insert a comma; page 14, line 57, claim 104, for the misspelled word "movemnt" read *movement*; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 4th day of October, A. D. 1927.

[SEAL.]

M. J. MOORE,
Acting Commissioner of Patents.

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