

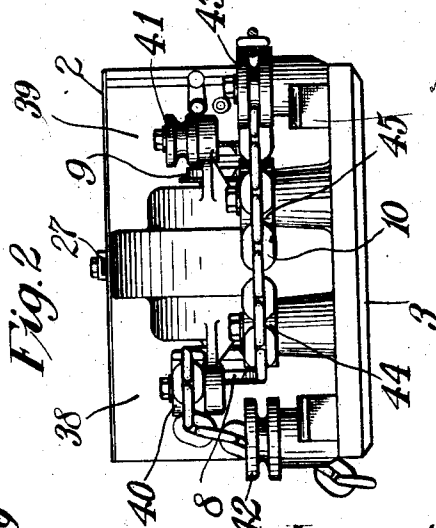
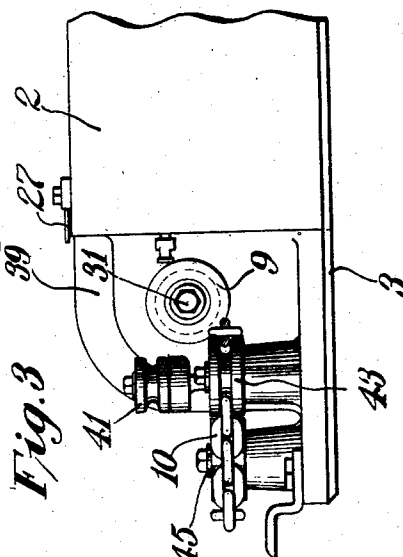
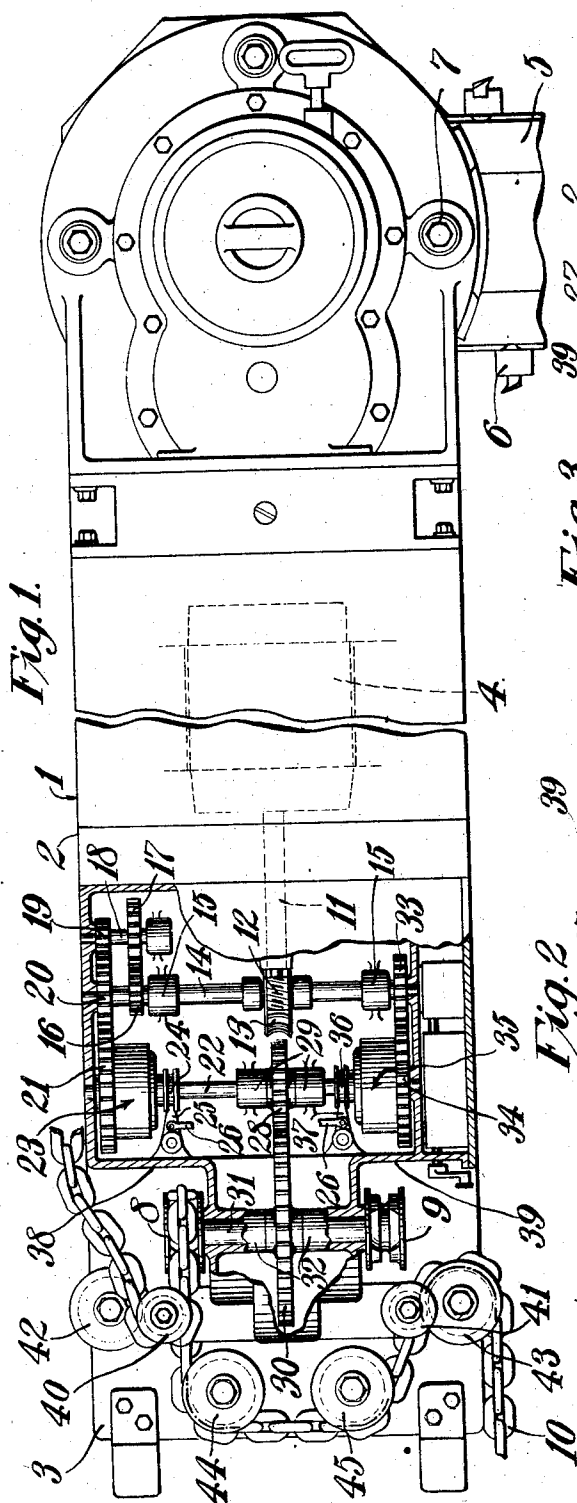
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M. P. HOLMES

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MINING MACHINE

Original Filed June 5, 1919



Inventor:  
Morris P. Holmes.  
by  
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Att'y.

## UNITED STATES PATENT OFFICE

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## MINING MACHINE

Original application filed June 5, 1919, Serial No. 301,917. Divided and this application filed November 1, 1924. Serial No. 747,317.

My invention relates to mining machines.

An object of my invention is to provide an improved mining machine. Another object of my invention is to provide an improved flexibly fed mining machine of the so-called longwall type. Still another object of my invention is to provide a mining machine having an improved simplified feeding mechanism. A further object of my invention is to provide an improved flexibly fed mining machine having an improved arrangement of its flexible feeding mechanism and improved operative connections for actuating said mechanism to propel the machine. A still further object of my invention is to provide an improved and simplified feeding arrangement and mechanism for a chain propelled mining machine and more especially for a chain propelled mining machine of the so-called longwall type whereby the same is rendered better adapted to service conditions. These and other objects and advantages of my improved mining machine will, however, hereinafter more fully appear.

In the accompanying drawings I have shown for purposes of illustration one form which my invention may assume in practice. In these drawings,—

Fig. 1 is a plan view of a mining machine within which my improved feeding mechanism is incorporated, the view being partially broken away in section.

Fig. 2 is an end elevation of the mining machine shown in Fig. 1 illustrating the improved arrangement of the chain driving and guide sprockets.

Fig. 3 is a partial side elevational view of the machine shown in Fig. 1.

In this illustrative form of my invention, which is a division of my copending application Ser. No. 301,917, filed June 5, 1919, now matured into Patent No. 1,662,786, patented March 13, 1928. I have shown a mining machine, generally designated 1, herein of the flexibly fed longwall type including a usual

elongated machine frame 2 mounted upon a shoe 3 and slidable thereon over the mine bottom, in a well known manner. The frame 2 carries a suitable motor 4, herein of the usual reversible type, said motor being horizontally and longitudinally disposed and as usually centrally located between the feed driving mechanism and the cutter chain driving mechanism. Inasmuch as the latter mechanism does not enter into the present invention it will therefore herein suffice to say that the same includes a cutter bar 5 pivotally mounted on one end of the frame 2, the bar carrying the usual cutter bit carrying chain 6 driven from one end of the motor shaft through usual transmission mechanism, not shown, and being movable angularly into a plurality of positions about its pivot and adapted to be fixed in any position by a suitable pin 7, all in a well known manner.

In my improved construction it will be observed that a plurality of feed operating members, herein in the form of coaxial driving sprockets 8 and 9, having a cooperating flexible feeding means, herein in the form of a feed chain 10, are disposed in an improved manner on a transverse horizontal axis at the opposite end of the frame 2 from the cutter bar, which, in a longwall machine, is the front end of the machine frame, and are driven by improved mechanism. As shown, these driving sprockets 8 and 9 are disposed transversely of the front end of the frame and are rotatable in a vertical plane about a transversely disposed axis. As illustrated, the coaxial driving sprockets are also driven from the motor 4, the adjacent end of the motor armature shaft 11 carrying a worm 12 which, in turn, meshes with a worm gear 13 centrally fixed to a transversely disposed operating horizontal driving shaft 14, in turn, journaled in suitable bearings 15 on opposite sides and the bottom of the frame. The shaft 14 is herein connected to the driving sprockets 8 and 9 through a plurality of

improved operative connections or trains of gearing whereby the sprockets may be rotated at a plurality of speeds.

Referring to the feed driving mechanism, we will first consider the slow feed mechanism. Herein it will be observed that a small pinion 16 is fixed near one end of the shaft 14 and meshes with a larger pinion 17 carried on the inner end of a stub shaft 18 journaled on the frame and disposed parallel to the shaft 14 and between the latter and the motor. This stub shaft 18, in turn, carries a small pinion 19 on its opposite end which meshes with a larger pinion 20 freely rotatable on the shaft 14 and disposed between the pinion 16 and the side of the frame. As shown, this pinion 20 in turn meshes with a still larger pinion or gear 21 which is suitably connectible with a rearwardly located transversely disposed shaft 22 by means of a friction clutch mechanism, generally designated 23, herein of the usual disc type and controlled by a usual clutch shipper 24 movable on the shaft 22 and herein operable by controlling mechanism including a lever 25 engageable with the shipper and operatively connected to a transverse link 26 and other mechanism, not shown, with a controlling lever 27 disposed on the top of the machine casing. A spur gear 28 is suitably secured to the shaft 22 and disposed between suitable bearings 29 in which the shaft 22 is journaled. The gear 28 meshes with a larger gear 30, in turn, carried directly on a horizontal shaft 31 journaled in bearings 32 formed on the frame and to which shaft said chain driving sprockets 8 and 9 are suitably rigidly secured. In considering the fast feed mechanism it will herein be noted that fixed to the opposite end of the shaft 14 from the pinion 16 is a suitable small pinion 33 meshing with a considerably larger gear 34 rotatable on the opposite end of the shaft 22 from that carrying the gear 21 and similarly located. The connection of this gear 34 to the shaft 22 is in turn controlled by a suitable friction mechanism, generally designated 35, and similar to the friction clutch mechanism 23, and likewise controlled by a shipper 36 through a lever 37, the lever in turn being connected to the link 26 and is likewise controllable by the controlling lever 27. Thus it will be observed that when the lever 27 is operated in such a manner as to operate the friction clutch mechanism 23 the driving sprockets 8 and 9 will be rotated at a slow speed and if the lever is operated in an opposite direction operating the friction clutch mechanism 35 the driving sprockets 8 and 9 will be driven at a fast speed. It will herein be noted that suitable pockets 38 and 39 formed in the frame are provided at the opposite ends of the shaft 31 so that the chain driving sprockets 8 and 9 may be disposed within the lines of

the frame a substantial distance from the sides thereof. Associated with these driving sprockets, either of which may be used when desired, I have also provided guide sprockets 40 and 41 rotatable on vertical axes and adapted to direct the chain from the chain driving sprockets 8 and 9 to slightly forwardly located laterally disposed cooperating guide sprockets 42 and 43 rotatable on vertical axes and extending to the guides 40 and 41 and a pair of forwardly located cooperating guide sprockets 44 and 45 having the plane of their axes disposed parallel to the plane of the axes of the sprockets 42 and 43. In this construction it will be evident that by simply laying the chain around either of the guides 40 or 41 and over either of the chain driving sprockets 8 or 9 and passing the same around either of the front guide sprockets 44 and 45 and either of the guides 42 or 43, for instance in Fig. 1, the machine may be connected for movement along the face and that by some rearrangement of the chain relative to the guiding sprockets various other movements of the machine or its cutter bar may be obtained as desired.

As a result of my improved construction it will be observed that it is possible to eliminate entirely any necessity of threading the chain, thereby facilitating and speeding up the use of the machine under service conditions, at the same time that it is possible to utilize the weight or the slack of the slack chain to hold it upon the feed sprockets and to locate the chain driving mechanism as to interfere in no way with the movement of the machine close to the working face on the one side and the mine roof props on the other. These and other advantages will, however, be clearly apparent to those skilled in the art.

While I have in this application specifically described one form which my invention may assume in practice, it will be understood that this form of the same is shown for purposes of illustration and that the invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What I claim is new and desire to secure by Letters Patent is:

1. In a mining machine, a machine frame slidable on its bottom on the mine bottom during the cutting operation, a driving motor carried by said frame, cutting mechanism driven by said driving motor and disposed of at one side of the latter, and feeding means for effecting feed of the machine during cutting and driven by said motor, said feeding means including coaxial feeding members each adapted to cooperate directly with flexible feeding means and connected for rotation at equi-angular rates, said feeding members being disposed at the opposite side of said motor from said cutting mechanism.

2. In a mining machine, a driving motor, mutually coaxial feed operating members adapted to cooperate directly with flexible feeding means and disposed on opposite sides of the central longitudinal vertical plane of the machine, and means for driving said members at a fast and at a slow speed in the same direction including parallel shafts through both of which each of said members may be driven.

3. In a mining machine, a driving motor, mutually coaxial feed operating members adapted to cooperate directly with flexible feeding means and disposed on opposite sides of the central longitudinal vertical plane of the machine, and means for driving said members at a fast and at a slow speed in the same direction including parallel shafts through both of which each of said members may be driven and a plurality of frictional controlling means.

4. In a mining machine, a driving motor, mutually coaxial feed operating members adapted to cooperate directly with flexible feeding means and disposed on opposite sides of the central longitudinal vertical plane of the machine, and means for driving said members at a fast and at a slow speed in the same direction including parallel shafts through both of which each of said members may be driven and change speed gearing connecting said shafts.

5. In a mining machine, a frame having at one end thereof pivotally mounted cutting mechanism, adjacent the central portion thereof a motor, and at the front end thereof feeding means comprising a pair of coaxial feed operating members rotatable on horizontal axes and each adapted to cooperate with flexible feeding means, and guiding means for flexible feeding means including at each side of the central longitudinal vertical plane of the machine frame a plurality of guide sheaves.

6. In a mining machine, a frame having at one end thereof pivotally mounted cutting mechanism, adjacent the central portion thereof a motor, and at the front end thereof feeding means comprising a pair of coaxial feed operating members rotatable on horizontal axes and each adapted to cooperate with flexible feeding means, and guiding means for flexible feeding means including at each side of the central longitudinal vertical plane of the machine frame a plurality of guide sheaves all rotatable on vertical axes.

7. In a mining machine, a frame having at one end thereof pivotally mounted cutting mechanism, adjacent the central portion thereof a motor, and at the front end thereof feeding means comprising a pair of coaxial feed operating members rotatable on horizontal axes and each adapted to cooperate with flexible feeding means, and guiding

means for flexible feeding means including at each side of the central longitudinal vertical plane of the machine frame a pair of guide sheaves, said sheaves so arranged that their pitch circles lie in a common horizontal plane.

8. In a mining machine, a frame having at one end thereof pivotally mounted cutting mechanism, adjacent the central portion thereof a motor, and at the front end thereof feeding means comprising a pair of coaxial feed operating members rotatable on horizontal axes and each adapted to cooperate with flexible feeding means, and guiding means for flexible feeding means including at each side of the central longitudinal vertical plane of the machine frame three guide sheaves.

9. In a mining machine, a frame having at one end thereof pivotally mounted cutting mechanism, adjacent the central portion thereof a motor, and at the front end thereof feeding means comprising a pair of coaxial feed operating members rotatable on horizontal axes and each adapted to cooperate with flexible feeding means, and guiding means for flexible feeding means including at each side of the central longitudinal vertical plane of the machine frame three guide sheaves rotating on vertical axes.

10. In a mining machine, a frame having at one end thereof pivotally mounted cutting mechanism, adjacent the central portion thereof a motor, and at the front end thereof feeding means comprising a pair of coaxial feed operating members rotatable on horizontal axes and each adapted to cooperate with flexible feeding means, driving means for said members including a plurality of shafts rotating on axes parallel to a line parallel to the axes of rotation of said feed operating members, and guiding means for flexible feeding means including at each side of the central longitudinal vertical plane of the machine frame a plurality of guide sheaves.

11. In a mining machine, a frame having at one end thereof pivotally mounted cutting mechanism, adjacent the central portion thereof a motor, and at the front end thereof feeding means comprising a pair of coaxial feed operating members rotatable on horizontal axes and each adapted to cooperate with flexible feeding means, driving means for said members including a plurality of shafts rotating on axes parallel to a line parallel to the axes of rotation of said feed operating members, and guiding means for flexible feeding means including at each side of the central longitudinal vertical plane of the machine frame a plurality of guide sheaves all rotatable on vertical axes.

12. In a mining machine, a frame having at one end thereof pivotally mounted cutting mechanism, adjacent the central portion thereof a motor, and at the front end thereof

feeding means comprising a pair of coaxial feed operating members rotatable on horizontal axes and each adapted to cooperate with flexible feeding means, driving means for said members including a plurality of shafts rotating on axes parallel to a line parallel to the axes of rotation of said feed operating members, and guiding means for flexible feeding means including at each side of the central longitudinal vertical plane of the machine frame a pair of guide sheaves, said sheaves so arranged that their pitch circles lie in a common horizontal plane.

13. In a mining machine, a frame having at one end thereof pivotally mounted cutting mechanism, adjacent the central portion thereof a motor, and at the front end thereof feeding means comprising a pair of coaxial feed operating members rotatable on horizontal axes and each adapted to cooperate with flexible feeding means, driving means for said members including a plurality of shafts rotating on axes parallel to a line parallel to the axes of rotation of said feed operating members, and guiding means for flexible feeding means including at each side of the central longitudinal vertical plane of the machine frame three guide sheaves.

14. In a mining machine, a frame having at one end thereof pivotally mounted cutting mechanism, adjacent the central portion thereof a motor, and at the front end thereof feeding means comprising a pair of coaxial feed operating members rotatable on horizontal axes and each adapted to cooperate with flexible feeding means, driving means for said members including a plurality of shafts rotating on axes parallel to a line parallel to the axes of rotation of said feed operating members, and guiding means for flexible feeding means including at each side of the central longitudinal vertical plane of the machine frame three guide sheaves rotating on vertical axes.

15. In a mining machine, a frame having at one end thereof pivotally mounted cutting mechanism, adjacent the central portion thereof a motor, and at the front end thereof feeding means comprising a pair of coaxial feed operating members rotatable on horizontal axes and each adapted to cooperate with flexible feeding means, plural speed driving means for said members including a plurality of shafts rotating on axes parallel to a line parallel to the axes of rotation of said feed operating members, and guiding means for flexible feeding means including at each side of the central longitudinal vertical plane of the machine frame a plurality of guide sheaves.

16. In a mining machine, a frame having at one end thereof pivotally mounted cutting mechanism, adjacent the central portion thereof a motor, and at the front end thereof feeding means comprising a pair of coaxial

feed operating members rotatable on horizontal axes and each adapted to cooperate with flexible feeding means, plural speed driving means for said members including a plurality of shafts rotating on axes parallel to a line parallel to the axes of rotation of said feed operating members, and guiding means for flexible feeding means including at each side of the central longitudinal vertical plane of the machine frame a plurality of guide sheaves all rotatable on vertical axes.

17. In a mining machine, a frame having at one end thereof pivotally mounted cutting mechanism, adjacent the central portion thereof a motor, and at the front end thereof feeding means comprising a pair of coaxial feed operating members rotatable on horizontal axes and each adapted to cooperate with flexible feeding means, plural speed driving means for said members including a plurality of shafts rotating on axes parallel to a line parallel to the axes of rotation of said feed operating members, and guiding means for flexible feeding means including at each side of the central longitudinal vertical plane of the machine frame a pair of guide sheaves, said sheaves so arranged that their pitch circles lie in a common horizontal plane.

18. In a mining machine, a frame having at one end thereof pivotally mounted cutting mechanism, adjacent the central portion thereof a motor, and at the front end thereof feeding means comprising a pair of coaxial feed operating members rotatable on horizontal axes and each adapted to cooperate with flexible feeding means, plural speed driving means for said members including a plurality of shafts rotating on axes parallel to a line parallel to the axes of rotation of said feed operating members, and guiding means for flexible feeding means including at each side of the central longitudinal vertical plane of the machine frame three guide sheaves.

19. In a mining machine, a frame having at one end thereof pivotally mounted cutting mechanism, adjacent the central portion thereof a motor, and at the front end thereof feeding means comprising a pair of coaxial feed operating members rotatable on horizontal axes and each adapted to cooperate with flexible feeding means, plural speed driving means for said members including a plurality of shafts rotating on axes parallel to a line parallel to the axes of rotation of said feed operating members, and guiding means for flexible feeding means including at each side of the central longitudinal vertical plane of the machine frame three guide sheaves rotating on vertical axes.

20. In a mining machine, a frame having at one end thereof pivotally mounted cutting mechanism, adjacent the central portion thereof a motor, and at the front end

thereof feeding means comprising a pair of coaxial feed operating members rotatable on horizontal axes and each adapted to cooperate with flexible feeding means, plural speed driving means for said members including a plurality of shafts rotating on axes parallel to a line parallel to the axes of rotation of said feed operating means and speed controlling clutches comprising elements movable in directions longitudinal of said shafts, and guiding means for flexible feeding means including at each side of the central longitudinal vertical plane of the machine frame a plurality of guide sheaves.

21. In a mining machine, a frame having at one end thereof pivotally mounted cutting mechanism, adjacent the central portion thereof a motor, and at the front end thereof feeding means comprising a pair of coaxial feed operating members rotatable on horizontal axes and each adapted to cooperate with flexible feeding means, plural speed driving means for said members including a plurality of shafts rotating on axes parallel to a line parallel to the axes of rotation of said feed operating means and speed controlling clutches comprising elements movable in directions longitudinal of said shafts, and guiding means for flexible feeding means including at each side of the central longitudinal vertical plane of the machine frame a plurality of guide sheaves all rotatable on vertical axes.

22. In a mining machine, a frame having at one end thereof pivotally mounted cutting mechanism, adjacent the central portion thereof a motor, and at the front end thereof feeding means comprising a pair of coaxial feed operating members rotatable on horizontal axes and each adapted to cooperate with flexible feeding means, plural speed driving means for said members including a plurality of shafts rotating on axes parallel to a line parallel to the axes of rotation of said feed operating means and speed controlling clutches comprising elements movable in directions longitudinal of said shafts, and guiding means for flexible feeding means including at each side of the central longitudinal vertical plane of the machine frame a pair of guide sheaves, said sheaves so arranged that their pitch circles lie in a common horizontal plane.

23. In a mining machine, a frame having at one end thereof pivotally mounted cutting mechanism, adjacent the central portion thereof a motor, and at the front end thereof feeding means comprising a pair of coaxial feed operating members rotatable on horizontal axes and each adapted to cooperate with flexible feeding means, plural speed driving means for said members including a plurality of shafts rotating on axes parallel to a line parallel to the axes of rotation of said feed operating means

and speed controlling clutches comprising elements movable in directions longitudinal of said shafts, and guiding means for flexible feeding means including at each side of the central longitudinal vertical plane of the machine frame three guide sheaves.

24. In a mining machine, a frame having at one end thereof pivotally mounted cutting mechanism, adjacent the central portion thereof a motor, and at the front end thereof feeding means comprising a pair of coaxial feed operating members rotatable on horizontal axes and each adapted to cooperate with flexible feeding means, plural speed driving means for said members including a plurality of shafts rotating on axes parallel to a line parallel to the axes of rotation of said feed operating means and speed controlling clutches comprising elements movable in directions longitudinal of said shafts, and guiding means for flexible feeding means including at each side of the central longitudinal vertical plane of the machine frame three guide sheaves rotating on vertical axes.

25. In a mining machine, a frame slidable on its bottom directly on the mine bottom during cutting and having projecting from one end thereof cutting mechanism, a motor, and at the side of the motor remote from the end of the frame at which said cutting mechanism projects feeding means comprising a pair of feed operating members rotatable on horizontal axes and each adapted to cooperate with flexible feeding means and driving means for said members including a pair of driving elements each adapted to drive each of said members and respectively rotating at different speeds on axes parallel to a common straight line.

26. In a mining machine, a frame slidable on its bottom directly on the mine bottom during cutting and having projecting from one end thereof cutting mechanism, a motor, and at the side of the motor remote from the end of the frame at which said cutting mechanism projects feeding means comprising a pair of feed operating members rotatable on horizontal axes and each adapted to cooperate with flexible feeding means and driving means for said members including a pair of driving elements each adapted to drive each of said members and respectively rotating at different speeds on axes parallel to a common straight line and clutch means operable to cause either of said elements to operate as the driving element.

27. In a mining machine, a frame slidable on its bottom directly on the mine bottom during cutting and having projecting from one end thereof cutting mechanism, a motor, and at the side of the motor remote from the end of the frame at which said cutting mechanism projects feeding means comprising a pair of feed operating members



rotatable on horizontal axes and each adapted to cooperate with flexible feeding means and driving means for said members including a pair of driving elements each adapted to drive each of said members and respectively rotating at different speeds on axes lying in a common vertical plane.

28. In a mining machine, a frame slidable on its bottom directly on the mine bottom during cutting and having projecting from one end thereof cutting mechanism, a motor, and at the side of the motor remote from the end of the frame at which said cutting mechanism projects feeding means comprising a pair of feed operating members rotatable on horizontal axes and each adapted to cooperate with flexible feeding means and driving means for said members including a pair of driving elements each adapted to drive each of said members and respectively rotating at different speeds on axes lying in a common vertical plane and clutch means operable to cause either of said elements to operate as the driving element.

29. In a mining machine, a frame slidable on its bottom directly on the mine bottom during cutting and having projecting from one end thereof cutting mechanism, a motor, and at the side of the motor remote from the end of the frame at which said cutting mechanism projects feeding means comprising a pair of feed operating members rotatable on horizontal axes and each adapted to cooperate with flexible feeding means and driving means for said members including a pair of driving elements each adapted to drive each of said members and respectively rotating at different speeds on axes parallel to a common straight line and flexible feeding means guiding sheaves at opposite sides of the central longitudinal vertical plane of the machine frame.

30. In a mining machine, a frame slidable on its bottom directly on the mine bottom during cutting and having projecting from one end thereof cutting mechanism, a motor, and at the side of the motor remote from the end of the frame at which said cutting mechanism projects feeding means comprising a pair of feed operating members rotatable on horizontal axes and each adapted to cooperate with flexible feeding means and driving means for said members including a pair of driving elements each adapted to drive each of said members and respectively rotating at different speeds on axes parallel to a common straight line and clutch means operable to cause either of said elements to operate as the driving element, and flexible feeding means guiding sheaves at opposite sides of the central longitudinal vertical plane of the machine frame.

31. In a mining machine, a frame slidable on its bottom directly on the mine bottom during cutting and having projecting from

one end thereof cutting mechanism, a motor, and at the side of the motor remote from the end of the frame at which said cutting mechanism projects feeding means comprising a pair of feed operating members rotatable on horizontal axes and each adapted to cooperate with flexible feeding means and driving means for said members including a pair of driving elements each adapted to drive each of said members and respectively rotating at different speeds on axes lying in a common vertical plane, and flexible feeding means guiding sheaves at opposite sides of the central longitudinal vertical plane of the machine frame.

32. In a mining machine, a frame slidable on its bottom directly on the mine bottom during cutting and having projecting from one end thereof cutting mechanism, a motor, and at the side of the motor remote from the end of the frame at which said cutting mechanism projects feeding means comprising a pair of feed operating members rotatable on horizontal axes and each adapted to cooperate with flexible feeding means and driving means for said members including a pair of driving elements each adapted to drive each of said members and respectively rotating at different speeds on axes lying in a common vertical plane and clutch means operable to cause either of said elements to operate as the driving element, and flexible feeding means guiding sheaves at opposite sides of the central longitudinal vertical plane of the machine frame.

33. In a mining machine comprising a frame slidable over a mine bottom during cutting and having at its rear end a pivoted cutter bar, a plurality of feed operating members at the front end of said frame rotatable on a horizontal axis, a flexible feed member, and cooperating guiding means therefor for directing said feed member selectively around said feed operating members and forwardly from the front end of said machine.

34. In a mining machine comprising a frame slidable over a mine bottom during cutting and having at its rear end a pivoted cutter bar, a plurality of feed operating members at the front end of said frame and rotatable on a horizontal axis, a flexible feed member, and cooperating guiding means therefor for selectively directing said feed members around said feed operating members and either forwardly or rearwardly from the front end of said machine.

35. The combination with a mining machine, of a plurality of feed driving members at the front end thereof disposed on a horizontal axis, a flexible feed member selectively engageable therewith, and guiding means including a plurality of simultaneously operative cooperating guiding mem-

bers disposed on opposite sides of said driving members.

36. The combination with a mining machine, of a plurality of transverse shafts, driving mechanism for one of the same, fast and slow feed mechanisms between said shafts, a horizontal shaft on the front end of said machine, means operatively connecting the same to either feed mechanism, and a plurality of feed sprockets on said horizontal shaft, each of said feed sprockets being adapted to cooperate with flexible feeding means anchored at a point extraneous of the machine.

37. The combination with a mining machine, fast and slow feed mechanisms on the front end thereof, a horizontally disposed shaft extending in front of said mechanisms, means for selectively connecting the same and said feed mechanisms, and a plurality of feed sprockets on said shaft rotatable on axes in a vertical plane, each of said feed sprockets being adapted to cooperate with flexible feeding means anchored at a point extraneous of the machine.

38. The combination with a mining machine, fast and slow feed mechanisms on the front end thereof, a horizontally disposed shaft extending in front of said mechanisms, means for selectively connecting the same and said feed mechanisms, and a plurality of feed sprockets on said shaft rotatable in vertical planes, each of said feed sprockets being adapted to cooperate with flexible feeding means anchored at a point extraneous of the machine.

39. The combination with a mining machine, of a plurality of transverse shafts, fast and slow feed mechanisms connected between the same, driving mechanism operatively connected with one of said shafts between the ends of the same, a horizontally disposed feed shaft carrying a plurality of feed sprockets, each of said feed sprockets being adapted to cooperate with flexible feeding means anchored at a point extraneous of the machine, and driving connections therefor between the ends of the other transverse shaft.

40. The combination with a mining machine, of a feed mechanism including a plurality of transverse shafts, fast and slow feed mechanisms operatively connected between the same, a horizontally disposed shaft on the front end of said machine, means for selectively connecting the latter with either of said feed mechanisms, and a plurality of feed sprockets carried on said horizontal shaft, each of said feed sprockets being adapted to cooperate with flexible feeding means anchored at a point extraneous of the machine.

41. The combination with a mining machine, of feeding mechanism including a plurality of transverse shafts, fast and slow feed

mechanisms operatively connected between the opposite ends of the same, a horizontally disposed transversely extending shaft, means for selectively connecting said last mentioned shaft with either of said feed mechanisms, and a plurality of feed sprockets carried on said last mentioned shaft, each of said feed sprockets being adapted to cooperate with flexible feeding means anchored at a point extraneous of the machine.

42. A mining machine slidable over a mine bottom on its bottom including a frame having at one end thereof a cutter bar having cutting mechanism associated therewith and operative upon actuation of the cutting mechanism associated therewith oppositely to cut and clear kerfs in opposite directions when the machine frame is oppositely propelled, and means for feeding said machine in opposite directions during cutting including a plurality of feed operating members adjacent the other end of said frame and rotatable upon a horizontal axis extending transversely of said frame, flexible feeding means cooperating therewith, and guiding members adapted to cooperate with said flexible feeding means and selectively operative dependent upon the direction of feed and arranged on vertical axes on opposite sides of the end of said frame remote from said cutting mechanism.

43. A mining apparatus including a frame slidable on its bottom directly on the mine bottom during cutting and supporting at one end thereof cutting mechanism, and means for effecting propulsion of said frame during cutting in a path parallel to the major dimensions of said frame including at the end of said frame remote from said cutting mechanism a plurality of driving members rotatable upon a horizontal axis extending transversely of said frame, and driving means for said cutting mechanism and said members including a motor disposed between said cutting mechanism and said members on said frame and having a power shaft disposed in a plane perpendicular to the axis of rotation of said members, the driving means for the members including means for effecting plural predetermined speed driving thereof.

44. The combination with a mining machine, a plurality of feed operating members each rotatable on a horizontal axis, each of said feed operating members being adapted to cooperate with flexible feeding means anchored at a point extraneous of the machine, and common means for driving said members including a plurality of horizontal shafts disposed parallel with the axes of said members and a plurality of friction clutches.

45. The combination with a mining machine, a plurality of feed operating members each rotatable on a horizontal axis, each



of said feed operating members being adapted to cooperate with flexible feeding means anchored at a point extraneous of the machine, and common means for driving said members including worm gearing, a plurality of shafts disposed parallel with the axes of said members, and a plurality of friction clutches.

46. In a mining machine, a cutter supporting frame, a motor thereon, feeding mechanism thereon including a plurality of plural predetermined speed feed operating members, and cooperating feeding and guiding means including a single flexible feeding member alternatively engageable with different operating members to feed said frame at a plurality of speeds in either direction.

47. In a mining machine, a frame slidable on its bottom directly on the mine bottom during cutting and supporting cutting mechanism, and feeding mechanism on said frame comprising a feed operating member rotatable on a horizontal axis and adapted to cooperate directly with flexible feeding mechanism and guiding means for said flexible feeding mechanism including a plurality of guide sheaves rotatable on vertical axes and arranged with their pitch circles in horizontal planes tangent to the top and bottom of the pitch circle of said feed operating member.

48. In a mining machine, a frame slidable on its bottom directly on the mine bottom during cutting and having at one end thereof pivotally mounted cutting mechanism, adjacent the central portion thereof a motor, and at the opposite end thereof feeding means comprising a pair of feed operating members each adapted to cooperate with flexible feeding means, and cooperating guiding means for said flexible feeding means whereby the latter may be extended from either of said members from opposite sides of the machine.

49. In a mining machine, a frame slidable on its bottom directly on the mine bottom during cutting and having at one end thereof pivotally mounted cutting mechanism, adjacent the central portion thereof a motor, and at the opposite end thereof feeding means comprising a pair of feed operating members rotatable on horizontal axes and each adapted to cooperate with flexible feeding means, and cooperating guiding means for said flexible feeding means whereby the latter may be extended from either of said members from opposite sides of the machine.

50. In a mining machine, a frame slidable on its bottom directly on the mine bottom during cutting and having at one end thereof pivotally mounted cutting mechanism, adjacent the central portion thereof a motor, and at the opposite end thereof feeding means comprising a pair of feed operating

members rotatable on horizontal axes and each adapted to cooperate with flexible feeding means, and cooperating guiding means for said flexible feeding means whereby the latter may be extended from either of said members from opposite sides of the machine, said flexible feeding means being adapted to swing said cutting mechanism in opposite directions and to feed the machine in opposite directions during cutting.

51. In a mining machine, a frame slidable on its bottom directly on the mine bottom during cutting and having projecting from one end thereof cutting mechanism, a motor, and at the side of the motor remote from the end of the frame at which said cutting mechanism projects feeding means comprising a pair of feed operating members each adapted to cooperate with flexible feeding means, and driving means for said members including a pair of driving elements each adapted to drive each of said members and respectively rotating at different speeds on axes parallel to a common straight line.

52. In a mining machine, a frame slidable on its bottom directly on the mine bottom during cutting and having projecting from one end thereof cutting mechanism, a motor, and at the side of the motor remote from the end of the frame at which said cutting mechanism projects feeding means comprising a pair of feed operating members each adapted to cooperate with flexible feeding means, and driving means for said members including a pair of driving elements each adapted to drive each of said members and respectively rotating at different speeds on axes parallel to a common straight line, and clutch means operable to cause either of said elements to operate as the driving element.

53. In a mining machine, a frame slidable on its bottom directly on the mine bottom during cutting and having projecting from one end thereof cutting mechanism, a motor, and at the side of the motor remote from the end of the frame at which said cutting mechanism projects feeding means comprising a pair of feed operating members each adapted to cooperate with flexible feeding means, and driving means for said members including a pair of driving elements each adapted to drive each of said members and respectively rotating at different speeds on axes lying in a common vertical plane.

54. In a mining machine, a frame slidable on its bottom directly on the mine bottom during cutting and having projecting from one end thereof cutting mechanism, a motor, and at the side of the motor remote from the end of the frame at which said cutting mechanism projects feeding means comprising a pair of feed operating members each adapted to cooperate with flexible feeding means, and driving means for said members includ-

ing a pair of driving elements each adapted to drive each of said members and respectively rotating at different speeds on axes lying in a common vertical plane, and clutch means operable to cause either of said elements to operate as the driving element.

55. In a mining machine, a frame slidable on its bottom directly on the mine bottom during cutting and having projecting from one end thereof cutting mechanism, a motor, and at the side of the motor remote from the end of the frame at which said cutting mechanism projects feeding means comprising a pair of feed operating members each adapted to cooperate with flexible feeding means, and driving means for said members including a pair of driving elements each adapted to drive each of said members and respectively rotating at different speeds on axes parallel to a common straight line, and flexible feeding means guiding sheaves at opposite sides of the central longitudinal vertical plane of the machine frame.

56. In a mining machine, a frame slidable on its bottom directly on the mine bottom during cutting and having projecting from one end thereof cutting mechanism, a motor, and at the side of the motor remote from the end of the frame at which said cutting mechanism projects feeding means comprising a pair of feed operating members each adapted to cooperate with flexible feeding means, and driving means for said members including a pair of driving elements each adapted to drive each of said members and respectively rotating at different speeds on axes parallel to a common straight line, and clutch means operable to cause either of said elements to operate as the driving element, and flexible feeding means guiding sheaves at opposite sides of the central longitudinal vertical plane of the machine frame.

57. In a mining machine, a frame slidable on its bottom directly on the mine bottom during cutting and having projecting from one end thereof cutting mechanism, a motor, and at the side of the motor remote from the end of the frame at which said cutting mechanism projects feeding means comprising a pair of feed operating members each adapted to cooperate with flexible feeding means, and driving means for said members including a pair of driving elements each adapted to drive each of said members and respectively rotating at different speeds on axes lying in a common vertical plane, and flexible feeding means guiding sheaves at opposite sides of the central longitudinal vertical plane of the machine frame.

58. In a mining machine, a frame slidable on its bottom directly on the mine bottom during cutting and having projecting from one end thereof cutting mechanism, a

motor, and at the side of the motor remote from the end of the frame at which said cutting mechanism projects feeding means comprising a pair of feed operating members each adapted to cooperate with flexible feeding means, and driving means for said members including a pair of driving elements each adapted to drive each of said members and respectively rotating at different speeds on axes lying in a common vertical plane, and clutch means operable to cause either of said elements to operate as the driving element, and flexible feeding means guiding sheaves at opposite sides of the central longitudinal vertical plane of the machine frame.

59. In a mining machine, a frame slidable on its bottom directly on the mine bottom during cutting and having at one end thereof cutting mechanism, adjacent the central portion thereof a motor, and at the opposite end thereof feeding means comprising a pair of feed operating members each adapted to cooperate with flexible feeding means, and cooperating guiding means for said flexible feeding means whereby the latter may be extended from either of said members from opposite sides of the machine.

60. In a mining machine, a frame slidable on its bottom directly on the mine bottom during cutting and having at one end thereof cutting mechanism, adjacent the central portion thereof a motor, and at the opposite end thereof feeding means comprising a pair of feed operating members rotatable on horizontal axes and each adapted to cooperate with flexible feeding means, and cooperating guiding means for said flexible feeding means whereby the latter may be extended from either of said members from opposite sides of the machine.

61. In a mining machine, a frame slidable on its bottom directly on the mine bottom during cutting and having at one end thereof cutting mechanism, adjacent the central portion thereof a motor, and at the opposite end thereof feeding means comprising a pair of feed operating members rotatable on horizontal axes and each adapted to cooperate with flexible feeding means, and cooperating guiding means for said flexible feeding means whereby the latter may be extended from either of said members from opposite sides of the machine, said flexible feeding means having free end portions engageable with different feed operating members to feed the machine in opposite directions during cutting in opposite directions.

62. In a mining machine, a frame slidable on its bottom directly on the mine bottom during cutting and having at one end thereof pivoted cutting mechanism, adjacent the central portion thereof a motor, and at the opposite end thereof feeding means comprising a pair of feed operating members each adapted

to cooperate with flexible feeding means, and cooperating guiding means for said flexible feeding means whereby the latter may be extended from either of said members from opposite sides of the machine, said flexible feeding means being adapted to swing said cutting mechanism in opposite directions and to feed the machine in opposite directions during cutting.

In testimony whereof I affix my signature.

MORRIS P. HOLMES.

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