

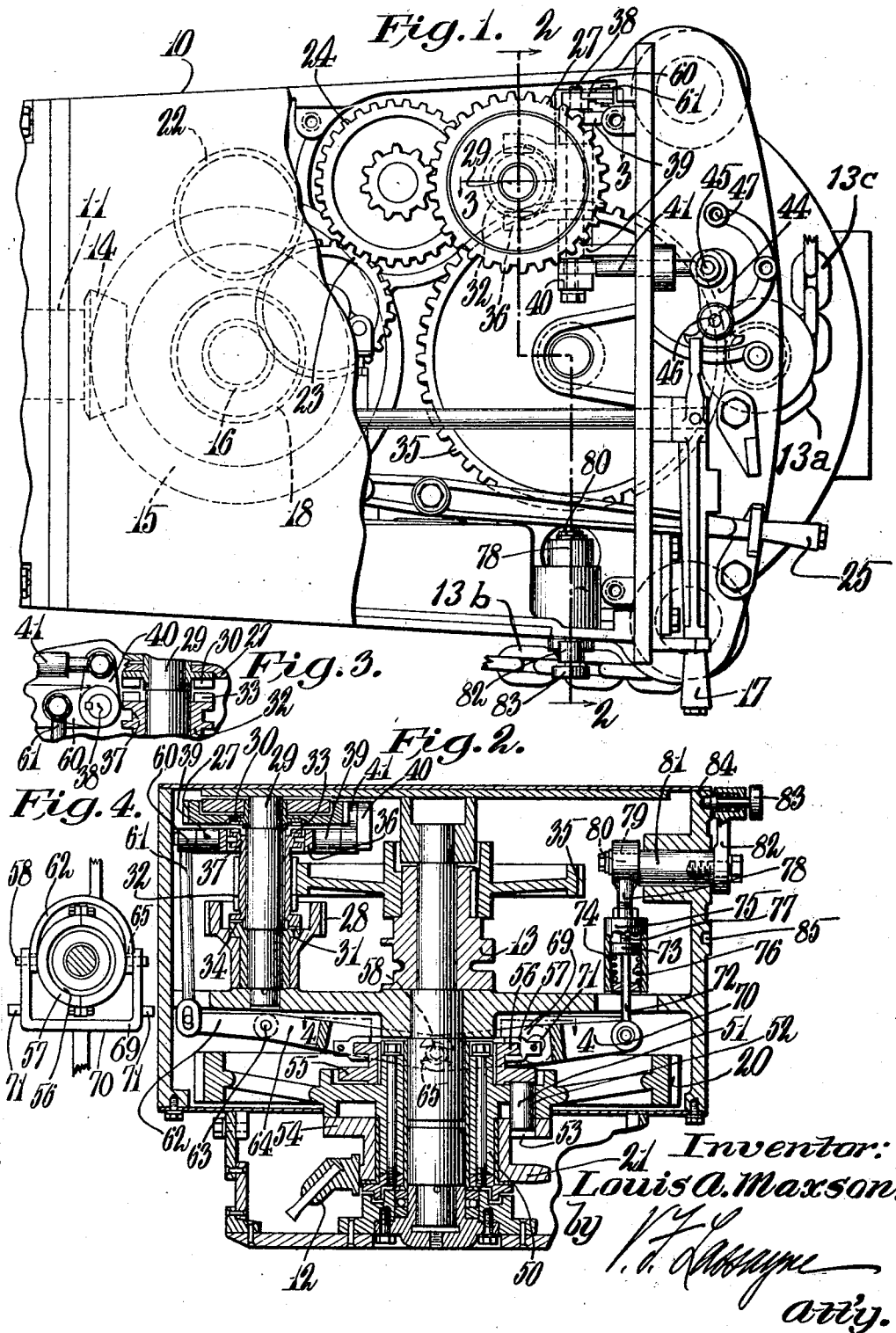
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MINING MACHINE

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MINING MACHINE.

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My invention relates to mining machines and more particularly to mining machines comprising motor operated cutting mechanism and motor operated feed operating and controlling mechanism.

In such machines a single motor is ordinarily employed to actuate both the feeding and cutting mechanisms, and the feeding mechanism ordinarily provides both a relatively fast machine moving speed, used to position the machine, to load it on its truck, to unload it therefrom, etc., and a relatively slow or cutting speed. The cutting mechanism is usually actuated through transmission mechanism including a manually operable clutch, and during all operations except actual cutting the machine runner may and should interrupt the orbital movement of the cutting elements, for accidents might very easily occur and the speed and power of the movement of the cutting elements is such that a leg might be very quickly severed.

It is, generally speaking, the object of the present invention to provide improved means for insuring automatically and without the need for thought on the part of the machine runner the interruption of cutting element movement whenever the machine is moving at rates above its cutting speed. It is to be understood that in the case of machines having sumping speeds in excess of normal transverse cutting speeds the automatic interruption is preferably to take place only when movement is in excess of the maximum cutting, or sumping, speed. More specifically, the object is to provide improved controlling means for the power transmission connections between the cutting mechanism and its driving means including means actuated by a controlling member for the feeding mechanism for disconnecting the cutting mechanism from its driving means when the feeding mechanism is operated at its "moving" or positioning speed, said parts permitting disconnection of the cutting mechanism from its driving means at any other time as well, at the will of the operator.

In a preferred form the invention comprises cutting mechanism, driving means therefor, a clutch or similar power transmission controlling device between the same, controlling means permitting positive disconnection of the cutting mechanism from its driving means at any time and connection thereof except as later specified, plural speed

feeding means, controlling means therefor, and means controlled by said feeding means controlling means controlling the capacity of said cutting mechanism drive controlling means to effect driving connection, said last mentioned means being effective only at certain higher speeds of feed. More generally speaking, the invention comprises cutting mechanism, driving means therefor, feeding means, controlling means therefor determining the speed thereof, and means precluding drive of said cutting mechanism by its driving means at certain speeds of said feeding means.

In the accompanying drawings, in which one embodiment of the invention is shown for purposes of illustration,

Fig. 1 is a top view with parts broken away of the rear end of a mining machine.

Fig. 2 is a section on the line 2—2 of Fig. 1.

Fig. 3 is a detail vertical sectional view on the line 3—3 of Fig. 1.

Fig. 4 is a fragmentary horizontal section on the plane of the line 4—4 of Fig. 2, parts towards the front end of the machine being at the left of the figure.

In views 1 and 2 is illustrated a portion of a mining machine 10 which comprises a motor whose armature shaft 11 is operative to drive cutting mechanism, a portion of which is shown at 12, and feeding mechanism including a feed operating member 13 in the form of a sprocket which cooperates with a chain 13^a having portions at the opposite sides of the sprocket respectively designated 13^b and 13^c. The sprocket 13 constitutes an ultimate power transmitting element or traction means common to both fast and slow speed drives as will later appear. The armature shaft 11 carries a bevel pinion 14 which drives a bevel gear 15 rotating on a vertical axis and driving through a suitable frictionally controlled pinion 16 the feed operating mechanism of the mining machine. The frictional controlling mechanism is not illustrated, but like the feed mechanism as a whole is of the type shown in the patent to Morris P. Holmes, No. 1,544,067, granted June 30, 1925, and is controlled by a manually operable lever 17. The cutting mechanism is driven through a pinion 18 constantly rotating with the gear 15 and meshing with a large gear 20 coaxial with a cutter chain driving sprocket 21, this mechanism also corresponding in the illustrative form of the invention

precisely with the mechanism disclosed in said Holmes patent.

The feeding mechanism comprises reversing mechanism including gears 22 and 23 selectively connectible in driving relation to a gear 24 under the control of the lever 25 to effect drive in opposite directions of the gear 24. The feed operating mechanism also comprises a plurality of gears as more fully illustrated in said patent to Holmes and particularly including a pair of constantly driven gears 27 and 28 which rotate at substantially different speeds, the gear 27 being rotatable at a speed proportional to the machine moving speed while the gear 28 is rotatable at a speed bearing the same ratio to the cutting speed. The gears 27 and 28 are rotatably mounted upon a vertical stud 29 and are respectively operatively connected to clutch elements 30 and 31 having teeth directed towards each other. Mounted for rotation upon the shaft 29 intermediate the clutch members 30 and 31 is a relatively long driving pinion 32 slidable longitudinally of the shaft and having at its opposite ends clutch teeth 33 and 34 alternatively engageable respectively with the clutch members 30 and 31. The pinion 32 meshes with and constitutes a driving element for a gear 35 which is keyed or otherwise suitably held in non-rotative relation to the feed operating member 13 and drives the latter. From the description so far given it will be apparent that upward movement of the pinion 32 to connect the clutch teeth 33 with the clutch 30 causes rotation of the feed operating member 13 at the fast or machine positioning and moving speed, while downward movement of the pinion 32 to connect the teeth 34 with the clutch 31 causes driving of the feed operating member 13 at a slow or cutting speed.

Vertical movements of the pinion 32 and its associated clutch teeth are accomplished by a shifter mechanism including a yoke 36 operatively connected with a grooved collar 37 formed upon an extension of the pinion 32. Yoke 36 is mounted upon a shaft 38 journaled in suitable bearings in brackets 39 carried upon the frame, and oscillatory movement is imparted to the shaft 38 by means including a lever arm 40 secured thereto and an adjustable link 41 connected to the lever arm and to operating mechanism for effecting reciprocatory movement of the link 41 including a manually adjustable pivoted operating handle 44 which carries a pin 45 arranged eccentrically with respect to its own axis of pivotal movement and connected to the link 41. Pin means generally designated 46 carried by the handle 44 and adapted to cooperate with a plurality of recesses 47 to hold the handle 44 in different positions enables the yoke 36 to be positively held in slow speed effecting position (see Fig. 1), in neutral position, and in fast speed position, the

handle 44 under the latter condition occupying a position 180 degrees from that of Fig. 1. This handle and arm together constitute a primary controlling element by whose positioning either of the possible speeds of feed may be selected.

The cutter chain driving sprocket is journaled for rotation upon the exterior of a sleeve 50 carried by the gear 20 and is adapted to be connected for driving by said gear by a series of clutch pins 51 vertically reciprocable through openings 52 in the gear 20 and adapted to enter openings 53 in the sleeve 54 rotating with the sprocket 21. The pins 51 are carried upon a plate 55 which has a circular flange 56 thereon received in an internally grooved shipper ring 57 which is provided at diametrically opposite points with projecting pins 58 engageable by a plurality of shipper yokes which will shortly be described.

Held in non-rotative relation to the extremity of the shaft 38 is an arm 60 connected by a slotted link 61 to one end of an oscillating lever 62 journaled upon a stud 63 suitably supported upon the frame of the mining machine, the other arm 64 of the lever being branched to form a shipper yoke and the extremities of these arms being slotted as at 65 to cooperate with the pins 58. The pins 58 are engaged at points outside the arm first mentioned by other slotted arms 69 formed upon a member 70 pivotally mounted at 71 for oscillation relative to the main frame. The member 70 is pivotally connected at its rear end to a link 72 which at its upper end carries a head 73 reciprocable in the bore 74 of a hollow member 75. A spring 76 in the bore normally maintains the head 73 in engagement with the inwardly projecting extremity 77 of a link member 78 provided with a transverse slot 79 cooperating with an eccentric pin 80 on a rotatable shaft 81. The shaft 81 is provided with an operating handle 82 carrying a manually releasable spring actuated pin and handle member 83 which may be moved from the position in Fig. 2, in which it engages with an opening 84 in the main frame, to a position in which the pin engages with an opening 85, at which time the movements of the handle 82 from the position shown in Fig. 2 to a diametrically opposite position move the pins 51 completely out of engagement with the recesses 53 in the ring 54 and thereby effect disconnection between the cutting mechanism and its driving means.

From the description given the mode of operation of this mechanism will be clearly apparent. It will be evident that with the parts in the position shown in Fig. 2 the cutter chain is capable of being driven in a normal manner. Upward movement of the pinion 32 may be accomplished to a position corresponding to the neutral position of the

handle 44, i. e., to a position in which the clutch teeth 33 and 34 are both disengaged without effecting any movement of the pins 51 due to the loose connection between the link 61 and the lever 62. Further upward movement, however, of the pinion 32 will cause such downward movement of the link 61 as to cause the pins 58 to raise the clutch pins 51 completely out of engagement with the recesses 53, the spring 76 yielding to permit this result. It will be evident moreover that in view of the slotted connection between the link 61 and the lever 62 the handle 82 may at any time be operated by the machine runner to effect positive downward movement of the link elements 78 and 72 and corresponding upward movement of the cutter chain driving sprocket. It will therefore be apparent that the clutch controlling driving of the cutting mechanism will be moved to disconnecting position at any time by the machine runner by operation of the handle 82 and that notwithstanding the movement of the handle 82 to a position normally effecting connection of the clutch the cutter chain drive will be interrupted whenever the handle 44 assumes the position in which the feeding member 13 will be driven at the fast or machine moving and positioning speed. It will therefore be apparent that the operator can not possibly run the risk of injuring himself or his helper due to the running of the cutter chain while the machine is being moved and positioned.

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 as new and desire to secure by Letters Patent is:

1. In a mining machine, cutting mechanism, driving means therefor, machine feeding means operative to provide a plurality of feeding speeds, and controlling means for said machine feeding means determining the transmitted speed of the latter and precluding driving of the cutting mechanism by its driving means at a certain speed of said feeding means, said controlling means including an operator controlled primary controlling element by whose positioning any of said plurality of speeds may be selected.

2. In a mining machine, cutting mechanism, driving means therefor and clutch means for effecting connection therebetween, feeding means operative to provide a plurality of speeds, controlling means therefor determining the speed thereof including a primary control element by whose positioning any of said plurality of speeds may be selected, and means interrupting the connection

between said cutting mechanism and the driving means therefor invariably at a certain speed of said feeding means selected by positioning of said control element.

3. In a mining machine, cutting mechanism, driving means therefor, feeding means, controlling means therefor determining the speed thereof including an element operative on movement in one direction to effect fast feed and on movement in an opposite direction to effect slow feed, and means controlled by said element of said controlling means interrupting the connection between said cutting mechanism and the driving means therefor at certain speeds of said feeding means.

4. In a mining machine, a motor, cutting mechanism, operative connections between the motor and said cutting mechanism including a clutch, feeding means, operative connections between said motor and said feeding means including plural speed driving connections and a manually controlled member determining the speed of drive and positionable to effect any of the possible driving speeds, and means governed by said manually controlled member controlling the driving connections between the cutting mechanism and said motor.

5. In a mining machine, cutting mechanism, driving means therefor, feed operating means, plural speed driving means therefor, controlling mechanism for said cutting mechanism driving means including a manually operable controlling element, controlling mechanism for said feeding mechanism driving means determining the speed of drive thereof and including a manually operable controlling element positionable to effect different feeding speeds, and operative connections between said controlling means rendering said first mentioned controlling means inoperative to effect driving connections when the manually operable controlling element of said second mentioned controlling means is operated in a predetermined manner.

6. In a mining machine, cutting mechanism, driving means therefor including a clutch member movable to interrupt drive, feeding mechanism and driving means therefor including clutch means movable to different positions to effect feed at different speeds, controlling means for said feeding means operative to move said clutch means to different positions, controlling means for said cutting mechanism operative to move said clutch to different positions, a yielding connection between one of said controlling means and its respective clutch, and means affording interconnection between said controlling means.

7. In a mining machine, cutting mechanism, driving means therefor including a clutch movable to interrupt drive, feeding mechanism and driving means therefor in-

cluding clutch means movable to different positions to effect feed at different speeds, controlling means for said feeding means operative to move said clutch means to different positions, controlling means for said cutting mechanism operative to move said clutch to different positions, a yielding connection between one of said controlling means and its respective clutch, and means including a lost motion connection affording interconnection between said controlling means.

8. In a mining machine, a motor, cutting mechanism driven thereby including a cutter bit carrying cutter bar, means for effecting movement of said cutter bar at a slow speed in one direction for cutting and at a fast speed in the opposite direction including the same ultimate power transmitting element during each of said movements, and means for automatically interrupting operation of said cutting mechanism when said fast speed bar moving means is operative.

9. In a mining machine, a motor, cutting mechanism driven thereby, means driven by

said motor for moving said cutting mechanism bodily in one direction at a slow speed for cutting and bodily in the opposite direction at a fast speed and including the same ultimate traction means at each speed, manually operable means for controlling the connection of said different speeds, and means governed by said manually controlled means for insuring interruption of the operation of said cutting mechanism when said cutting mechanism is moved at a fast speed.

10. In a mining machine, a motor, cutting mechanism driven thereby including a cutter bit carrying cutter bar, means for effecting movement of said cutter bar at a slow speed in one direction and at a fast speed in the opposite direction including a plurality of flexible feeding portions, and means for automatically interrupting operation of said cutting mechanism when said fast speed bar moving means is operative.

In testimony whereof I affix my signature.

LOUIS A. MAXSON.