Sept. 6, 1932. M. P. HOLMES 1,875,337

MINING MACHINE

Filed Dec. 30, 1929 4 Sheets-Sheet 1

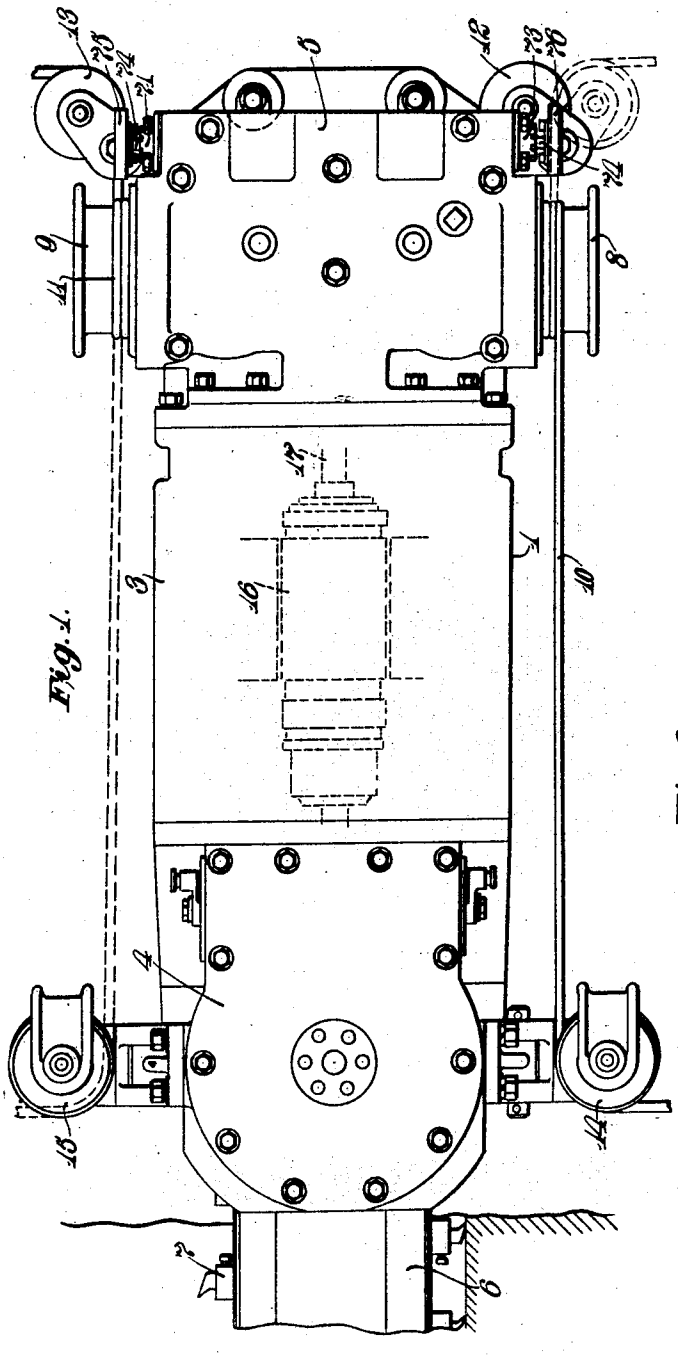

Fig. 1.

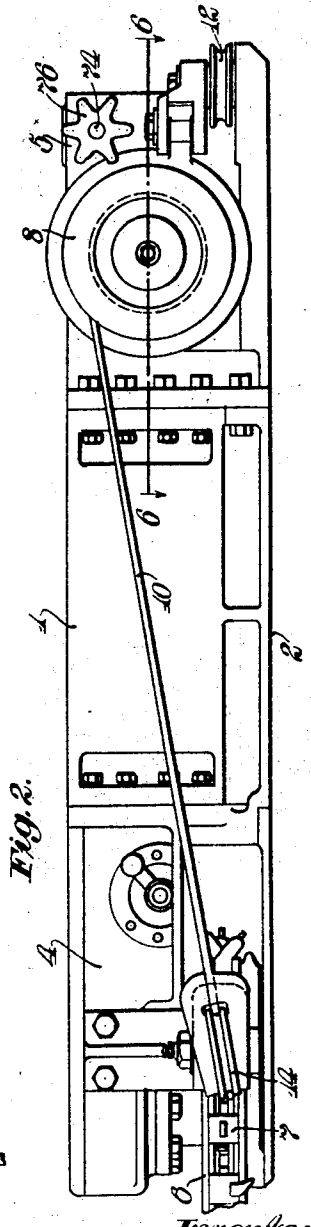

Fig. 2.

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Sept. 6, 1932. M. P. HOLMES 1,875,337

MINING MACHINE

Filed Dec. 30, 1929 4 Sheets-Sheet 2

Fig. 3.

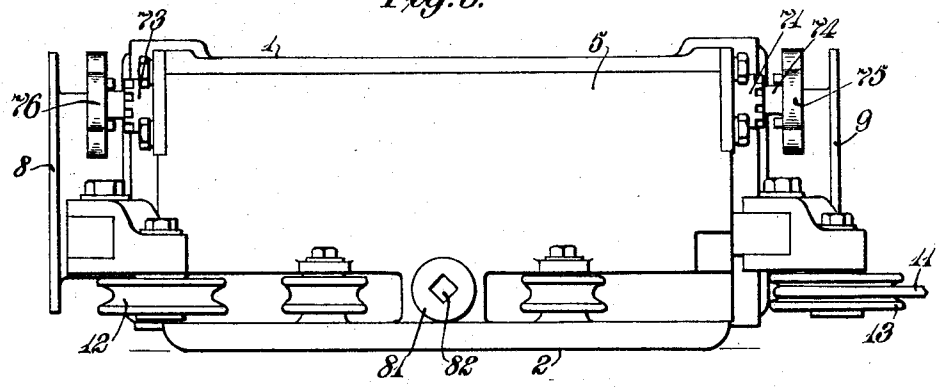


Fig. 4.

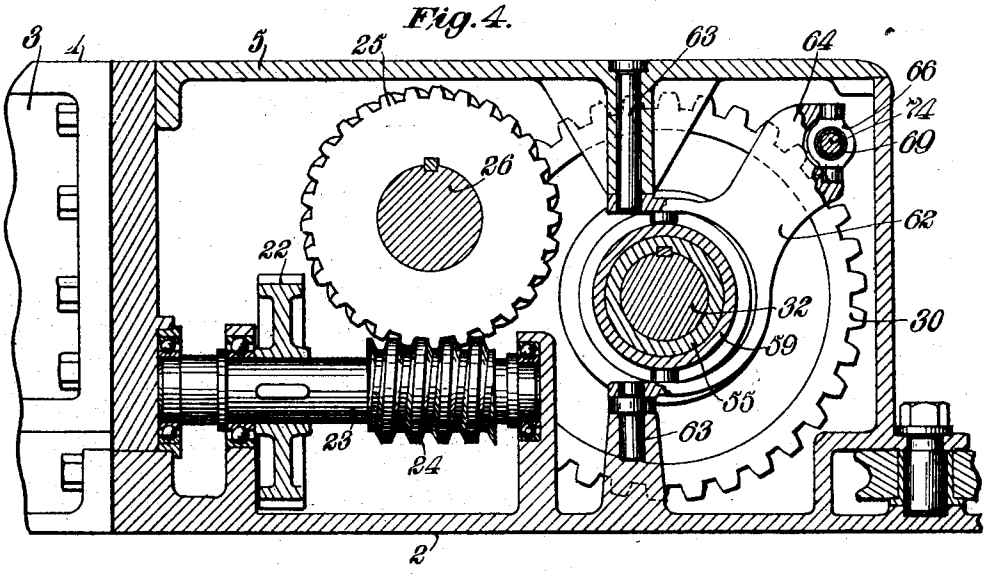
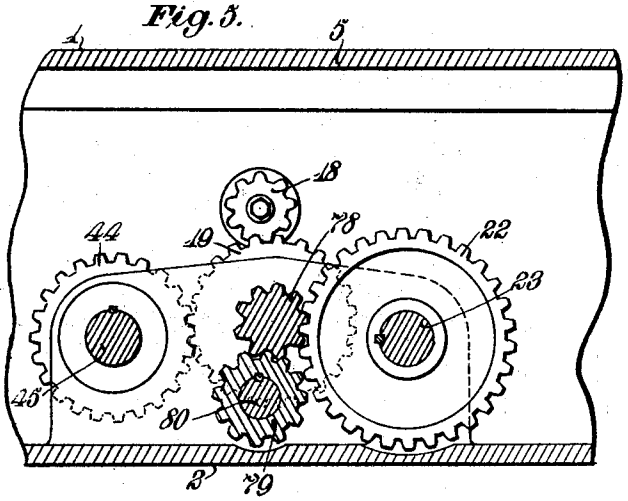


Fig. 5.



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Sept. 6, 1932. M. P. HOLMES 1,875,337

MINING MACHINE

Filed Dec. 30, 1929 4 Sheets-Sheet 3

Fig. 6.

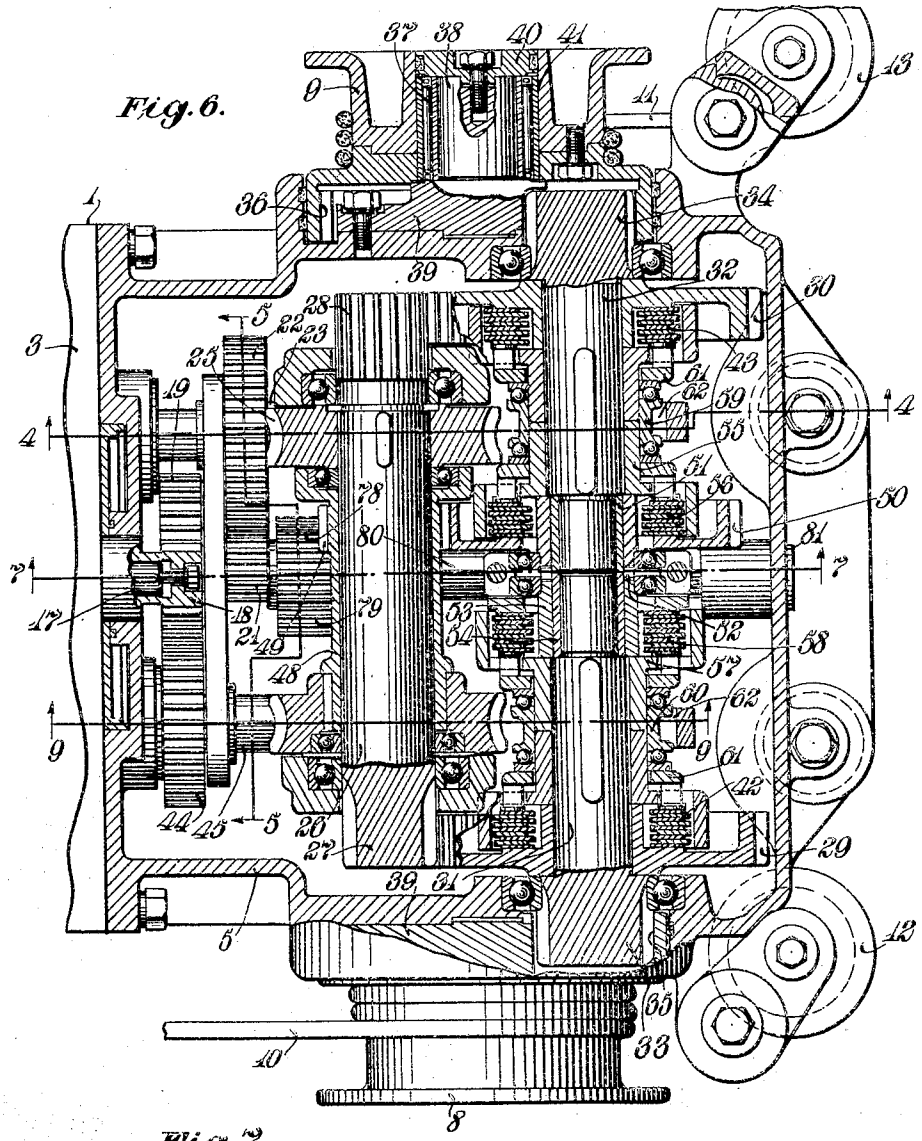
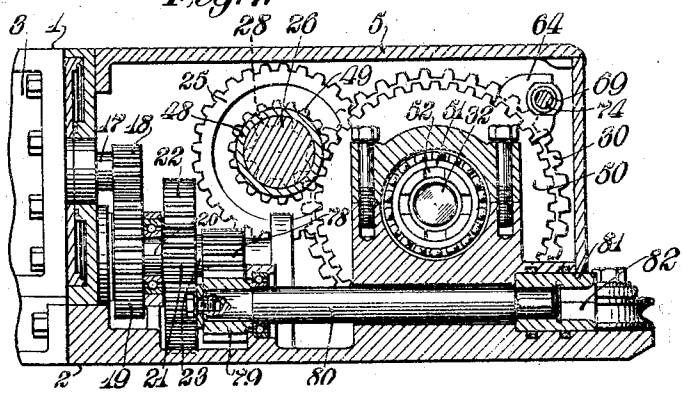


Fig. 7.



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MINING MACHINE

Filed Dec. 30, 1929 4 Sheets-Sheet 4

Fig. 8.

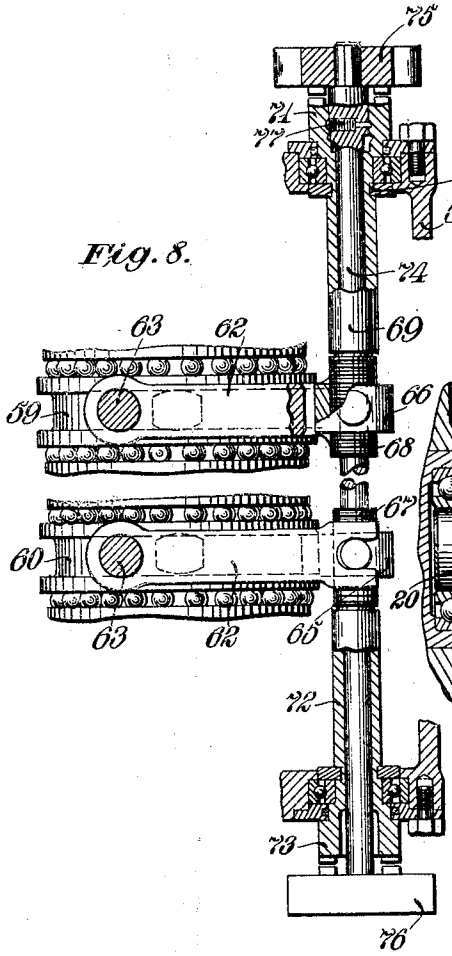


Fig. 10.

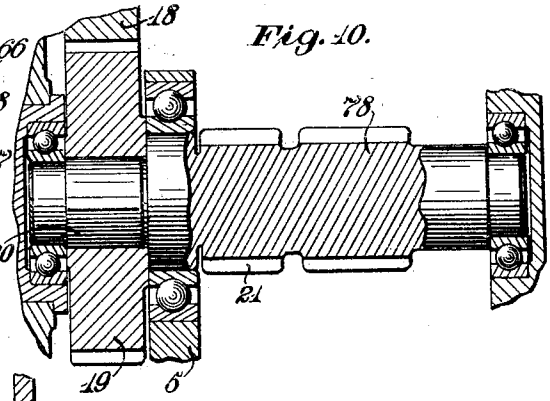
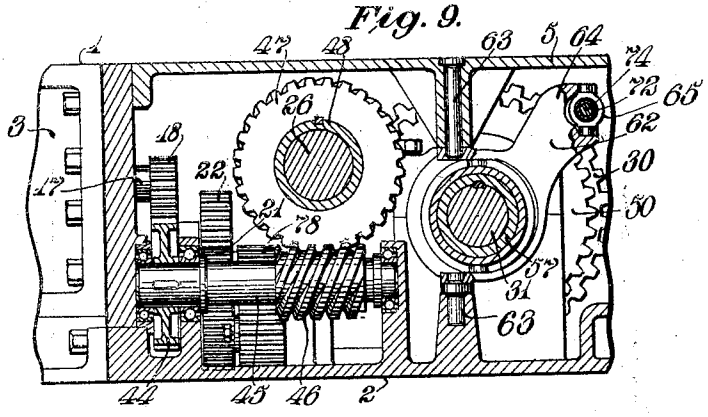


Fig. 9.



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Patented Sept. 6, 1932 1,875,337

UNITED STATES PATENT OFFICE

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MINING MACHINE

Application filed December 30, 1929. Serial No. 417,328.

This invention relates to improvements in mining machines and more particularly to coal mining machines of the flexibly fed, bottom cutting type.

An object of this invention is to provide an improved coal mining machine. Another object is to provide an improved mining machine of the flexibly fed, bottom cutting type. A further object is to provide an improved feeding mechanism for a coal mining machine. Another object is to provide an improved coal mining machine of the flexibly fed continuous cutter, bottom cutting type having improved feeding and guiding mechanism and more particularly improved feeding and guiding mechanism for a room and pillar type coal mining machine. Still another object is to provide an improved bottom cutting mining machine of the room and pillar type having improved machine feeding and guiding mechanism wherein separate relatively rotatable feed operating and controlling members and separate flexible feeding elements cooperating respectively therewith are employed for feeding and guiding the machine along the coal face. Another object is to provide in a mining machine of the aforesaid type improved feeding mechanism including relatively rotatable feed operating and controlling members mounted in an improved manner on the machine and having separate plural predetermined speed driving connections whereby said members may be rotated in winding direction either at the same time or separately at a plurality of predetermined speeds. It is also an object of this invention to provide in a mining machine of the aforesaid type improved driving and controlling means for the feed operating and controlling members whereby said members may rotate in a direction to draw in their respective flexible feeding elements either separately or simultaneously at a relatively slow cutting speed or at a relatively high machine moving speed, may rotate in a direction to pay out said flexible feeding elements under various degrees of frictional resistance, or without such resistance. Yet another object is to provide an improved flexible feeding mechanism for a coal mining machine which is of an exceedingly compact and rugged design whereby the machine may be fed and controlled in a more flexible and advantageous manner. These and other objects and advantages of this invention will hereinafter more fully appear from the following description and as more particularly pointed out in the appended claims.

In the accompanying drawings there is shown for purposes of illustration one form which the invention may assume in practice.

In these drawings,—

Fig. 1 is a plan view of a room and pillar type coal mining machine equipped with the illustrative embodiment of the improved flexible feeding means.

Fig. 2 is a side elevational view of the machine shown in Fig. 1.

Fig. 3 is a rear end elevational view of the improved mining machine.

Fig. 4 is a longitudinally extending vertical sectional view taken substantially on line 4—4 of Fig. 6.

Fig. 5 is a transverse vertical sectional view taken substantially on line 5—5 of Fig. 6.

Fig. 6 is a horizontal sectional view taken substantially on line 6—6 of Fig. 2.

Fig. 7 is a longitudinally extending vertical sectional view taken substantially on line 7—7 of Fig. 6.

Fig. 8 is a detail sectional view illustrating the control means for the speed controlling clutches.

Fig. 9 is a longitudinally extending vertical sectional view taken substantially on line 9—9 of Fig. 6.

Fig. 10 is a detail sectional view illustrating a portion of the feed gearing.

In this illustrative embodiment of the invention there is shown a coal mining machine of the flexibly fed, room and pillar, bottom cutting type, although it is obvious that the various novel features of the invention may be embodied in mining machines of various other types. This mining machine generally comprises a machine frame 1 having a plane bottom surface 2 upon which the machine is slidably supported for

movement over the mine bottom. The frame 1 consists of three main sections, namely, a central motor section 3, a front cutter carrying section 4 and a rear feed frame section 5, the three sections being rigidly secured together and when united forming a rigid low compact frame. Rigidly secured to the cutter frame section 4 and projecting forwardly therefrom is a horizontal plane cutter bar 6 having mounted on its margin an endless cutter bit carrying cutter chain 7. Arranged at opposite sides of the feed frame section 5 are feed operating and controlling members herein in the form of winding drums 8 and 9 with which feed cables 10 and 11 respectively cooperate. Suitable horizontally swingable guide sheaves 12 and 13 are arranged at the opposite rear corners of the feed frame section while vertically swingable swing arms supporting guide sheaves 14 and 15 are carried at the opposite sides of the cutter frame section 4 at the front end of the machine and these sheaves are adapted to guide the feed cables during the various operations of the machine. The motor section 3 houses a motor 16 herein preferably of the reversible electric type having its power shaft 17 horizontally disposed and extending longitudinally of the machine frame. The forward end of the motor is operatively connected to the cutter chain 7 through suitable transmission gearing, housed within the cutter frame section 4, which herein may be of the same general type as that described in my copending application Ser. No. 179,357, filed March 29, 1927, patented July 21, 1931, Pat. No. 1,815,873. The rear end of the motor power shaft is operatively connected through improved transmission connections as hereinafter described to the feeding and controlling drums 8 and 9.

Now referring to the improved feeding mechanism and more particularly to the improved transmission connections it will be noted that keyed to the rear end of the motor shaft 17 is a spur pinion 18 meshing with a spur gear 19 keyed, as shown in Fig. 10, to a horizontal longitudinally extending shaft 20. The shaft 20 is suitably journaled within the frame section 5 and has also secured thereto a spur pinion 21 meshing with a spur gear 22 keyed, as shown in Fig. 4, to a horizontal longitudinally extending shaft 23 arranged parallel with the shaft 20 above referred to. The shaft 23 is suitably journaled within the frame section 5 and has secured thereto a worm 24 meshing with a slow speed worm wheel 25, the latter being keyed to a horizontal shaft 26 extending transversely of the machine above the shafts 20 and 23 and suitably journaled within the frame section 5. Formed on the opposite ends of the shaft 26 are spur pinions 27 and 28 which mesh respectively with spur gears 29 and 30 journaled on alined horizontally extending shafts 31 and 32 respectively. These shafts are arranged parallel with and in the rear of the transverse shaft 26. Secured to the outer end of the shafts 31 and 32 are spur pinions 33 and 34 meshing respectively with internal gears 35, 36 secured to the feeding and controlling drums 8 and 9. It will herein be noted that the drums 8 and 9 are arranged at opposite sides of the machine on horizontal transverse axes and are each journaled as shown in Fig. 6 on a roller bearing 37 supported by a stub shaft 38 herein formed integral with a detachable side plate 39. These side plates are detachably secured to the opposite vertical side walls of the feed frame section 5. The drums are retained in position on their respective shafts by a detachable cap plate 40 secured by a screw to the stub shaft 38. In the present construction each of the feed drums is provided with a central bore 41 in which the bearing structure described above is housed. Again referring to the improved driving connections for the feed drums, it will be observed that the gear 29 is connectible to the shaft 31 by a multiple disc clutch 42, while a similar multiple disc clutch 43 is employed for connecting the gear 30 to the shaft 32. The operating means for the clutches 42, 43 will be hereinafter described. It will thus be seen that when the friction clutches 42 and 43 are applied, the feeding and controlling drums 8 and 9 may be driven in winding direction from the motor 16 at a relatively slow speed appropriate for feeding the machine during cutting through the spur gearing 18, 19, 21, and 22, the worm gearing 24, 25, the shaft 26, the gearing 28 and 30 and spur pinion 34 meshing with the internal gear 36 secured to the drum 9 and through gearing 27, 29 and spur pinion 33 meshing with the internal gear 35 secured to the drum 8. It will also be noted that the friction clutches 43, 43 are independently controllable so that the drums may be rotated at a slow speed to wind in their respective cables either separately or simultaneously as conditions may require.

Now referring to the transmission gearing for driving the feeding and controlling drums 8 and 9 in winding direction at a relatively high speed, it will be noted that meshing with the spur gear 19 is a spur gear 44 keyed, as shown in Fig. 9, to a horizontal longitudinally extending shaft 45. This shaft is suitably journaled within the feed frame section 5 and has secured thereto a worm 46 having teeth inclined in the same direction but of steeper lead than the teeth on the worm 24. This worm meshes with a fast speed worm wheel 47 keyed to a sleeve 48 rotatably mounted on the shaft 26. Carried by this sleeve is a spur pinion 49 meshing with a spur gear 50 journaled on a bearing sleeve 51 supported by a reduced inner end

of the transverse shaft 32. Secured as by a clutch 52 or otherwise suitably connected to the hub of the spur gear 50 is a sleeve member 53 rotatably mounted on a bearing sleeve 54 supported by the reduced inner end of the transverse shaft 31. Keyed to the shaft 32 is a clutch member 55 carrying the outer discs of a multiple disc clutch 56, the inner discs of the clutch being carried by the spur gear 50. Keyed to the shaft 31 is a clutch member 57 carrying the outer discs of a multiple disc clutch 58, the inner discs being carried by the sleeve member 53. It will thus be seen that when the clutches 56, 58 are applied, the feeding and controlling drums 8 and 9 may be driven in winding direction at a relatively fast speed from the motor through spur gearing 18, 19, 44, worm gearing 46, 47, sleeve 48, spur gearing 49, 50, shafts 31, 32, and spur pinions 33, 34 meshing with the internal gears 35, 36 secured to the drums 8 and 9 respectively.

The operating means for the feed controlling clutches 42, 43 and 56, 58 will now be described. Interposed between the clutches 56, 43 and slidably mounted on the adjacent hubs of the clutch elements is a shiftable clutch member 59, while mounted on the adjacent hubs of elements of clutches 42 and 58 is a similar member 60. Each of the members 59 and 60 act through usual thrust bearings on pressure plates 61, one for each clutch and each having fingers projecting into engagement with the end disc of the clutch. As clearly shown in Fig. 8, engaging each of the clutch applying members 59, 60 is a shipper yoke 62 pivoted at 63 on the feed frame section. The shipper yokes have integral projecting lever portions 64 bifurcated at their ends for connection to trunnions 65 and 66 respectively. Each of the trunnions is in the form of a nut threadedly connected to screws 67 and 68 respectively. The screw 68 is formed on a rotatable sleeve 69 rotatably supported at 70 within the side of the feed frame and carrying at its outer end a clutch member 71. A similar rotatable sleeve 72 is secured to the screw 67 and is likewise journaled within the feed frame and carries a similar clutch member 73. Extending axially through these sleeves is an operating rod 74 having keyed to its opposite ends clutch members in the form of hand wheels 75 and 76. A suitable plunger and groove connection 77 is employed for holding the rod 74 in either of its adjusted positions. It will thus be seen that when the hand wheel 76 is slid inwardly to connect the clutch teeth thereon with the clutch teeth on the member 73 and the hand wheel is rotated, the screw 67 is rotated, and as a result the shipper yoke is swung in one direction or the other to apply either the clutch 42 or the clutch 58. When the rod 74 is slid in the opposite direction, connecting the clutch teeth on the member 75 to the teeth on the member 71 and upon rotation of the rod, the screw 68 is rotated, swinging the shipper yoke to apply one or the other of the friction clutches 56, 43. It will therefore be evident that the sets of clutches 42, 58 and 56, 43 may be only alternatively applied and that the clutches may be controlled by the hand wheels 75, 76 from either side of the machine.

The improved mining machine is adapted to be mounted upon a truck during transport thereof about the mine and improved connections are provided so that the truck wheels may be driven from the mining machine motor. This improved truck wheel driving mechanism comprises a spur pinion 78 secured to the shaft 20 and meshing with a spur gear 79 (see Fig. 7) keyed to a horizontal longitudinally extending shaft 80. This shaft is suitably rotatably mounted within the feed frame section and has keyed thereto at its outer end a truck driving member 81 having formed therein a polygonal socket 82 for the reception of a correspondingly shaped member on the transport truck as is well known in the art. It will thus be seen that when the machine is mounted upon its transport truck, the truck wheels may be driven from the motor 16 through spur gearing 18, 19, shaft 20 and spur gearing 78 and 79 at a relatively high transport speed.

The operation of the improved mining machine will now be described. The mining machine is transported about the mine while supported upon its transport truck and the truck wheels are driven from the motor of the machine through the connections above referred to by the truck driving member 81. After the machine has been transported into the room which is desired to be worked, the machine is unloaded from its truck in a usual manner and one or the other of the cables 10, 11 is extended from its respective drum to a suitable anchor located adjacent the coal face at the right hand rib of the room. One or the other of the fast speed controlling frictions 56, 58 is then applied, and the desired drum is driven in winding direction at a relatively high speed, moving the machine rapidly over the mine floor as the cable is wound in. When the machine is suitably positioned adjacent the face at the right hand rib, the cable 11 is extended from the drum 9 around the guide sheave 13 forwardly along the side of the machine to a suitable anchor. The cable 10 is extended from the drum 8 around the front guide sheave 14 and laterally from the machine across the coal face to a suitable anchor located at the left hand rib of the room. The friction clutch 43 is then applied and the drum 9 is rotated in winding direction at a relatively slow speed, winding in the cable 11 and moving the machine endwise to sump the cutter bar 6 beneath the coal

face. During this sumping operation the friction clutch 42 is so applied to cause the drum 8 to tend to wind in the cable 10, thereby maintaining the desired controlling tension on the cable to provide guiding means for the machine during the sumping operation. After the cutter bar has been sumped beneath the coal the machine is straightened up and fed transversely across the face, the drum 9 winding in the cable 10 at a relatively slow speed under the control of the friction clutch 42, while the drum 9 maintains the cable 11 under the desired controlling tension under the control of the friction clutch 43. If it is desired to angle the machine during its transverse cutting operation, this may be accomplished by releasing the friction clutch 43, thereby permitting the cable 11 to unwind from the drum 9 and as a result the rear end of the machine is swung forwardly by the pull of the feed cable 10 and the reaction of the cutters against the coal. If it is desired to swing the rear end of the machine rearwardly, this may be accomplished by slipping the friction 42 while the friction clutch 43 is applied, thereby causing the cable 11 to be drawn in, and as a result, swinging the rear end of the machine rearwardly. After the transverse cutting operation has been completed, the cutter bar is angled and withdrawn from the face in a well known manner under the control of the drums 8 and 9. The machine is then moved at a fast speed over the mine floor and loaded onto its transport truck to be transported to another working place. It is evident that the feed and controlling drums 8 and 9 under the control of the friction clutches 42, 58 and 56, 43 may be rotated in winding direction either separately or simultaneously at relative low speed or at a relatively high speed or may rotate in unwinding direction under various degrees of frictional resistance or without such resistance. These and other uses and advantages of this improved feeding mechanism will be clearly apparent to those skilled in the art.

As a result of this invention it will be noted that an improved feeding mechanism is provided for a coal mining machine of the flexibly fed, bottom cutting type wherein the machine may be fed and guided in a more flexible and advantageous manner. It will further be noted that an improved plural speed transmission mechanism is provided, frictionally controlled at each speed, whereby the feeding and controlling drums may be driven in winding direction either separately or at the same time at relatively high speed or at relatively low speed, may rotate in unwinding direction under various degrees of frictional resistance, or without such resistance. It will still further be evident that the improved feeding mechanism is extremely compact both vertically and laterally, and simple and rugged in design and controlled by large frictions well adapted to withstand the severe conditions of service.

While I have in this application specifically described one form which the 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. A mining machine feeding mechanism comprising relatively rotatable feed operating and controlling members each adapted to cooperate directly with flexible feeding means, and a plural speed driving mechanism for said members including alined shafts one connected to each member, a slow speed gear train for each shaft including a terminal gear coaxial with each shaft, a clutch for connecting each terminal gear to its respective shaft, a fast speed gear train including a terminal gear coaxial with said shafts, and clutches for connecting said shafts to said fast speed terminal gear.

2. A mining machine feeding mechanism comprising relatively rotatable feed operating and controlling members each adapted to cooperate directly with flexible feeding means, and a plural speed driving mechanism for said members including alined horizontal shafts one connected to each member, a slow speed gear train for each shaft including a terminal gear coaxial with each shaft, a clutch for connecting each terminal gear to its respective shaft, a fast speed gear train including a terminal gear coaxial with said shafts, and clutches for connecting said shafts to said fast speed terminal gear.

3. A mining machine feeding mechanism comprising relatively rotatable feed operating and controlling members each adapted to cooperate directly with flexible feeding means, and a plural speed driving mechanism for said members including alined horizontal shafts extending transversely of the machine one connected to each member, a slow speed gear train for each shaft including a terminal gear coaxial with each shaft, a clutch for connecting each terminal gear to its respective shaft, a fast speed gear train including a terminal gear coaxial with said shafts, and clutches for connecting said shafts to said fast speed terminal gear.

4. A mining machine feeding mechanism comprising relatively rotatable feed operating and controlling members each adapted to cooperate directly with flexible feeding means, and a plural speed driving mechanism for said members for rotating the latter either separately or simultaneously in a direction to draw in their respective flexible feeding means at relatively high speed and

at relatively low speed including relatively rotatable coaxial transmission members arranged on a horizontal axis extending transversely of the machine, a separate and distinct slow speed gear train for each member driven from one of said coaxial transmission members, and a high speed gear train common to both members driven from said other coaxial transmission member.

5. A mining machine feeding mechanism including relatively rotatable feed operating and controlling members each adapted to cooperate directly with flexible feeding means, and motor operated devices for driving said members in a direction to draw in their respective flexible feeding means at either a relatively high or a relatively low speed including alined shafts one connected to each member, fast and slow speed gear trains, one of said gear trains branching and having a gear element coaxial with each shaft, clutches for connecting said gear elements to their respective coaxial shafts, the other gear train including a gear element coaxial with said shafts, and clutches for connecting either of said shafts to said last mentioned gear element.

6. A mining machine feeding mechanism including relatively rotatable feed operating and controlling members each adapted to cooperate directly with flexible feeding means, and motor operated devices for driving said members in a direction to draw in their respective flexible feeding means at either a relatively high or a relatively low speed including alined shafts one connected to each member, slow speed gears one coaxial with each shaft, separate clutches for connecting said slow speed gears to their respective shafts, a fast speed gear coaxial with said shafts, and separate clutches for connecting said shafts to said fast speed gear.

7. A mining machine feeding mechanism including relatively rotatable feed operating and controlling members each adapted to cooperate directly with flexible feeding means, and motor operated devices for driving said members in a direction to draw in their respective flexible feeding means at relatively low speed or at relatively high speed including a fast speed gear train and a slow speed gear train, each gear train including a worm wheel, worms rotating on horizontal axes and meshing with said worm wheels respectively, and clutch devices for connecting either member in driving relation with either worm wheel or for connecting one member in driving relation with one worm wheel while the other member is simultaneously connected in driving relation with the other worm wheel.

8. A mining machine feeding mechanism including relatively rotatable feed operating and controlling members each adapted to cooperate directly with flexible feeding means, and motor operated devices for driving said members in a direction to draw in their respective flexible feeding means at relatively high speed or at relatively low speed including worm wheels rotating on horizontal axes, worms rotating on horizontal axes and meshing with said worm wheels respectively, and devices for connecting either member in driving relation with either worm wheel or for connecting one member in driving relation with one worm wheel while the other member is simultaneously connected in driving relation with the other worm wheel.

9. A mining machine feeding mechanism including relatively rotatable feed operating and controlling members each adapted to cooperate directly with flexible feeding means, and motor operated devices for driving said members in a direction to draw in their respective flexible feeding means at relatively high speed or at relatively low speed including worm wheels rotating on horizontal axes, worms rotating on horizontal axes extending longitudinally of the machine and meshing with said worm wheels respectively, and devices for connecting either member in driving relation with either worm wheel or for connecting one member in driving relation with one worm wheel while the other member is simultaneously connected in driving relation with the other worm wheel.

10. A mining machine feeding mechanism including relatively rotatable feed operating and controlling members each adapted to cooperate directly with flexible feeding means, and motor operated devices for driving said members in a direction to draw in their respective flexible feeding means at either a relatively high or a relatively low speed including coaxial relatively rotatable shafts, a fast speed gear train for driving one of said shafts including a fast speed worm wheel, a slow speed gear train for driving said other shaft including a slow speed worm wheel, worms rotating on horizontal axes and meshing with said worm wheels respectively, and devices for connecting either member in driving relation with either shaft.

11. A mining machine feeding mechanism including relatively rotatable feed operating and controlling members each adapted to cooperate directly with flexible feeding means, and motor operated devices for driving said members in a direction to draw in their respective flexible feeding means at either a relatively high or a relatively low speed including coaxial relatively rotatable shafts, a fast speed gear train for driving one of said shafts including a fast speed worm wheel, a slow speed gear train for driving said other shaft including a slow speed worm wheel, worms rotating on horizontal axes extending longitudinally of the machine and meshing with said worm wheels respectively,

and devices for connecting either member in driving relation with either shaft.

12. A mining machine feeding mechanism including relatively rotatable feed operating and controlling members each adapted to cooperate directly with flexible feeding means, and motor operated devices for driving said members in a direction to draw in their respective flexible feeding means at either a relatively high or a relatively low speed including a slow speed gear train and a fast speed gear train, one of said gear trains branching and including two terminal gears, one connectible to each member, separate clutches for connecting said terminal gears in driving relation with their respective members, said other gear train including a terminal gear common to both members, and separate clutches for connecting said common terminal gear in driving relation with either member, said common terminal gear always being disconnected from said members during driving of said members through said other terminal gears.

13. A mining machine feeding mechanism including relatively rotatable feed operating and controlling members each adapted to cooperate directly with flexible feeding means, and motor operated devices for driving said members in a direction to draw in their respective flexible feeding means at a relatively low or a relatively high speed including a fast speed gear train and a slow speed gear train including coaxial relatively rotatable shafts, alined shafts one connected to each member, and means for connecting either alined shaft in driving relation with either of said coaxial shafts and including two clutches individual to each alined shaft, one clutch of each of said pairs being controllable to connect the alined shaft to which it is individual to one coaxial shaft and the other clutch of that pair to connect the same alined shaft to said other coaxial shaft.

14. A mining machine feeding mechanism including relatively rotatable feed operating and controlling members each adapted to cooperate directly with flexible feeding means, and motor operated devices for driving said members in a direction to draw in their respective flexible feeding means at either a relatively high or a relatively low speed including a shaft, a gear train between one end of said shaft and one of said members, a gear train between the opposite end of said shaft and the other of said members, and a separate and distinct gear train common to the drive for both of said members, said latter gear train being entirely disconnected from said members during driving of said members through said other gear trains.

15. A mining machine feeding mechanism including relatively rotatable feed operating and controlling members each adapted to cooperate directly with flexible feeding means, and motor operated devices for driving said members in a direction to draw in their respective flexible feeding means at either a relatively high or a relatively low speed including a shaft, a gear train between one end of said shaft and one of said members, a gear train between the opposite end of said shaft and the other of said members, a separate and distinct gear train common to the drive for both of said members, said latter gear train being entirely disconnected from said members during driving of said members through said other gear trains, and clutches for connecting said members in driving relation with their respective gear trains.

16. A mining machine feeding mechanism including relatively rotatable feed operating and controlling members each adapted to cooperate directly with flexible feeding means, and motor operated devices for driving said members in a direction to draw in their respective flexible feeding means including coaxial relatively rotatable shafts, a fast speed gear train for driving one of said shafts and a slow speed gear train for driving said other shaft, a gear train between one end of one shaft and one of said members, and a gear train between the opposite end of said shaft and said other member, a gear train between said other coaxial shaft and both of said members, and clutch devices for connecting either member in driving relation with either of its respective gear trains.

17. A mining machine feeding mechanism including relatively rotatable feed operating and controlling members each adapted to cooperate directly with flexible feeding means, and motor operated devices for driving said members in a direction to draw in their respective flexible feeding means at either a relatively high or a relatively low speed including alined shafts one connected to each member, mutually coaxial relatively rotatable shafts, a gear train driven from one end of one of said coaxial shafts, and a gear train driven from the opposite end of said last mentioned coaxial shaft, one gear train being connectible to one alined shaft and and the other gear train being connectible to said other alined shaft, separate clutches for connecting said gear trains to their respective shafts, and means including clutch devices for connecting either of said alined shafts in driving relation with said other coaxial shaft.

18. A mining machine feeding mechanism including relatively rotatable feed operating and controlling members each adapted to cooperate directly with flexible feeding means, and motor operated devices for driving said members either separately or simultaneously in a direction to draw in their respective flexible feeding means including a slow speed transmission mechanism, said transmission

mechanism including a gear train through which one member is driven and a separate gear train through which the other member is driven, a fast speed transmission mechanism including a gear train through which both of said members are driven, and clutch devices for connecting said members in driving relation with their respective gear trains, said fast speed gear train being entirely disconnected from said members during driving of said members through said slow speed gear trains.

19. A mining machine feeding mechanism including relatively rotatable feed operating and controlling members each adapted to cooperate directly with flexible feeding means, and motor operated devices for driving said members either separately or simultaneously in a direction to draw in their respective flexible feeding means including a fast and slow speed transmission mechanism, said mechanism including three coaxial gears, and four clutches, two of said clutches controlling the connection of two of said gears with said members, and the other two of said clutches controlling the connection of said members with said third gear, said third gear remaining idle during driving of said members by said first two gears.

20. A mining machine feeding mechanism including relatively rotatable feed operating and controlling members each adapted to cooperate directly with flexible feeding means, and motor operated devices for driving said members either separately or simultaneously in a direction to draw in their respective flexible feeding means including aligned shafts one connected to each member, a slow speed transmission mechanism including separate gear trains one gear train connected to one aligned shaft and the other gear train connected to the other alined shaft, a fast speed transmission mechanism including a gear train connected to both of said alined shafts, and clutches controlling the connection of said shafts with their respective gear trains.

21. A mining machine feeding mechanism including relatively rotatable feed operating and controlling members each adapted to cooperate directly with flexible feeding means, and motor operated devices for driving said members either separately or simultaneously in a direction to draw in their respective flexible feeding means including a shaft, a second shaft, said shafts parallel to the same straight line, a slow speed gear train for driving one of said shafts, a fast speed gear train for driving said other shaft, a pair of shafts parallel with said shafts and respectively connected to said members, gear trains between one of said first mentioned shafts and said pair of shafts respectively, and a gear train between said second mentioned shaft and said pair of shafts.

22. A mining machine feeding mechanism including relatively rotatable feed operating and controlling members each adapted to cooperate directly with flexible feeding means and motor operated devices for driving said members either separately or simultaneously in a direction to draw in their respective flexible feeding means including coaxial relatively rotatable shafts, alined shafts one connected to each member and arranged parallel with said coaxial shafts, a slow speed gear train for driving one of said coaxial shafts, separate gear trains between said slow speed coaxial shaft and said alined shafts, a fast speed gear train for driving said other coaxial shaft, and a gear train between said fast speed coaxial shaft and said alined shafts, and clutches for connecting said alined shafts with the gear trains through which they are drivable.

23. A mining machine feeding mechanism including relatively rotatable feed members each adapted to cooperate directly with flexible feeding means, and motor operated driving means therefor including a slow speed gear train having coaxial driving elements and a fast speed gear train having a single driving element rotating on an axis parallel to the axis of said coaxial elements, and clutch mechanism for connecting one of said feed members to one of said slow speed driving elements and the other feed member to said other slow speed driving element and for connecting either feed member in driving relation with said fast speed driving element.

24. A mining machine feeding mechanism including relatively rotatable feed members each adapted to cooperate directly with flexible feeding means, and motor operated driving means for said members including a slow speed gear train having coaxial driving gears, a fast speed gear train having a single driving gear arranged on an axis parallel with the axis of said coaxial gears, friction clutches, one individual to each slow speed driving gear, for connecting one gear to one feed member and the other gear to the other feed member and friction clutches for connecting either feed member in driving relation with said fast speed gear.

In testimony whereof I affix my signature.

MORRIS P. HOLMES.