Jan. 6, 1959 J. A. RUSSELL ET AL 2,867,427

DISINTEGRATING MECHANISM FOR LONGWALL CONTINUOUS MINER

Original Filed Dec. 5, 1949 3 Sheets-Sheet 1

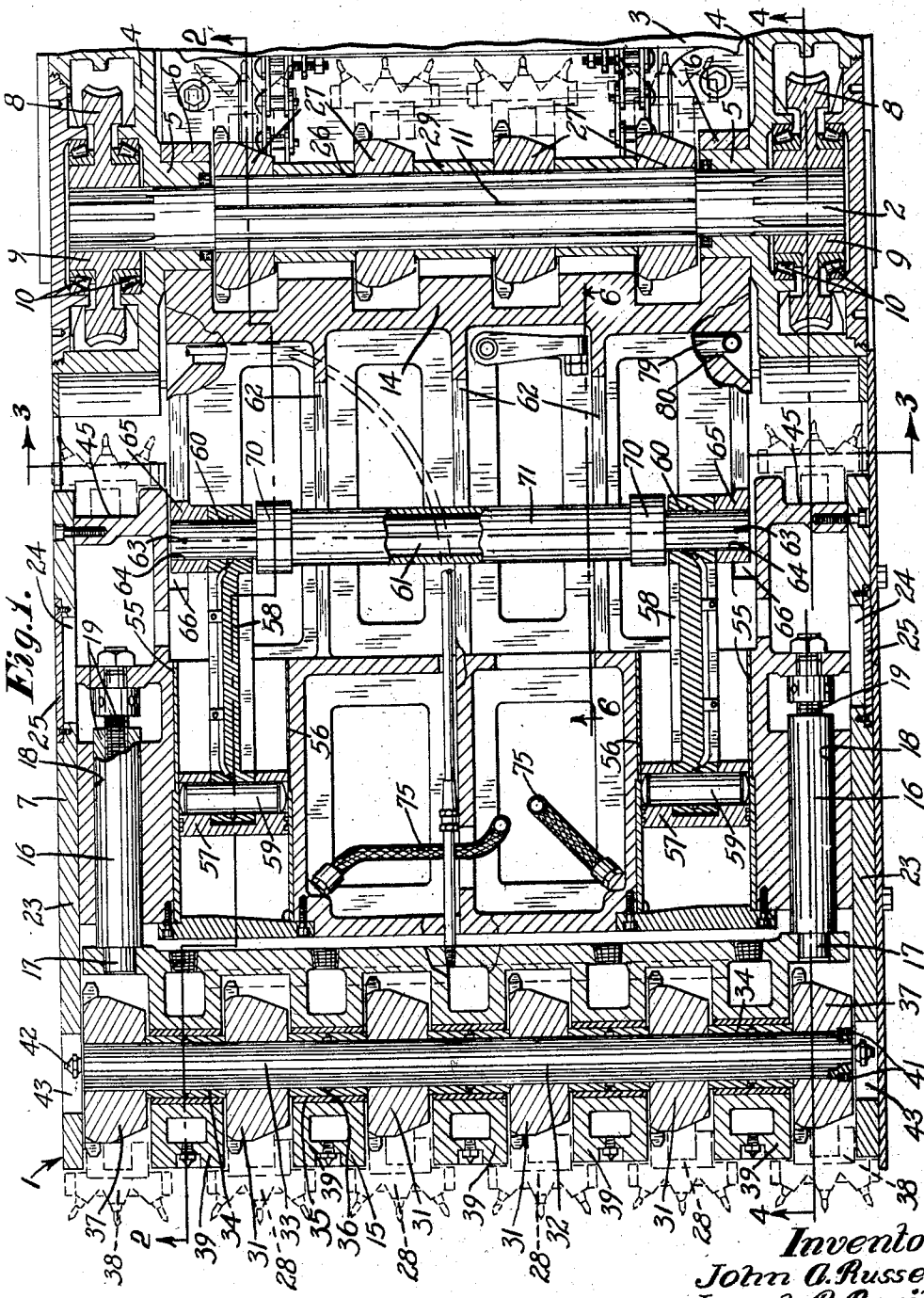


Fig. 1.

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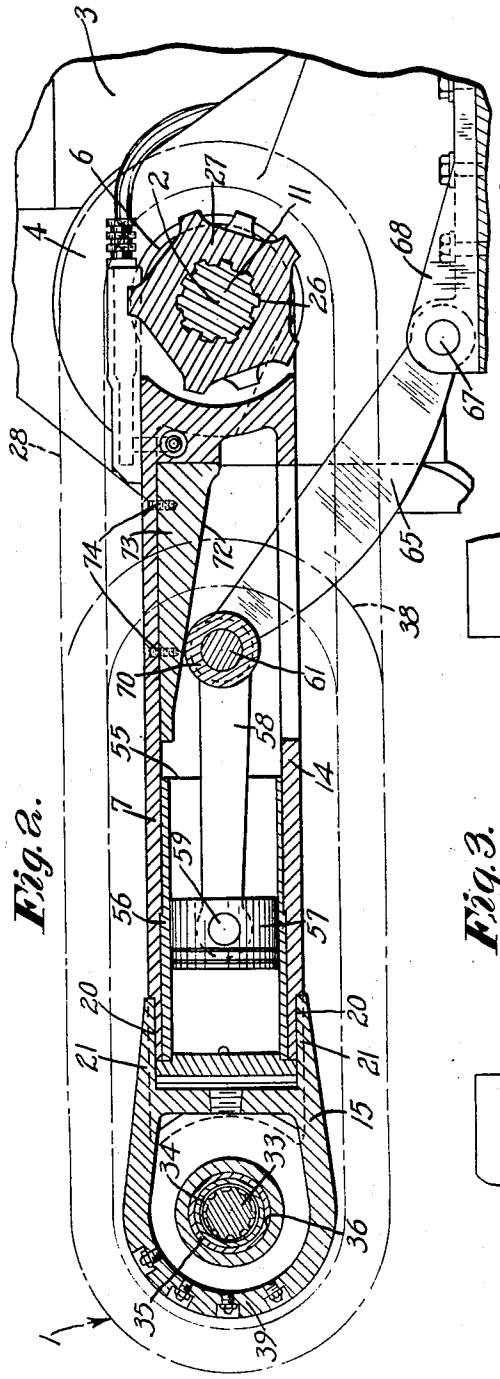


Fig. 2.

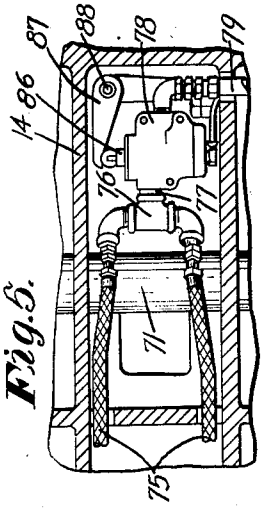


Fig. 5.

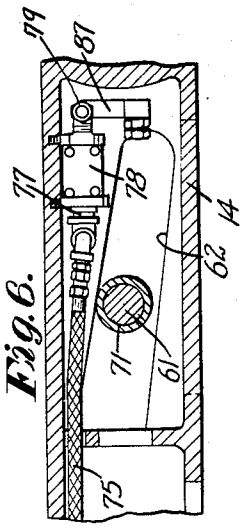


Fig. 6.

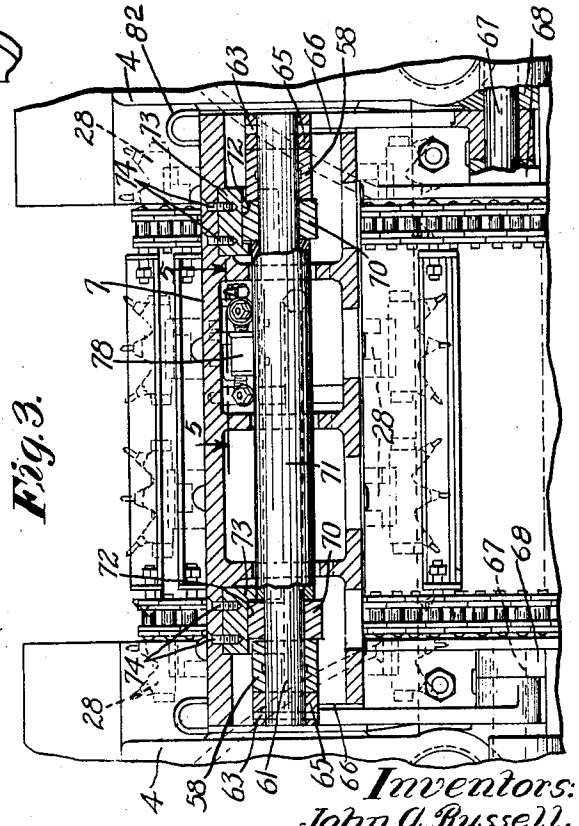


Fig. 3.

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DISINTEGRATING MECHANISM FOR LONGWALL CONTINUOUS MINER

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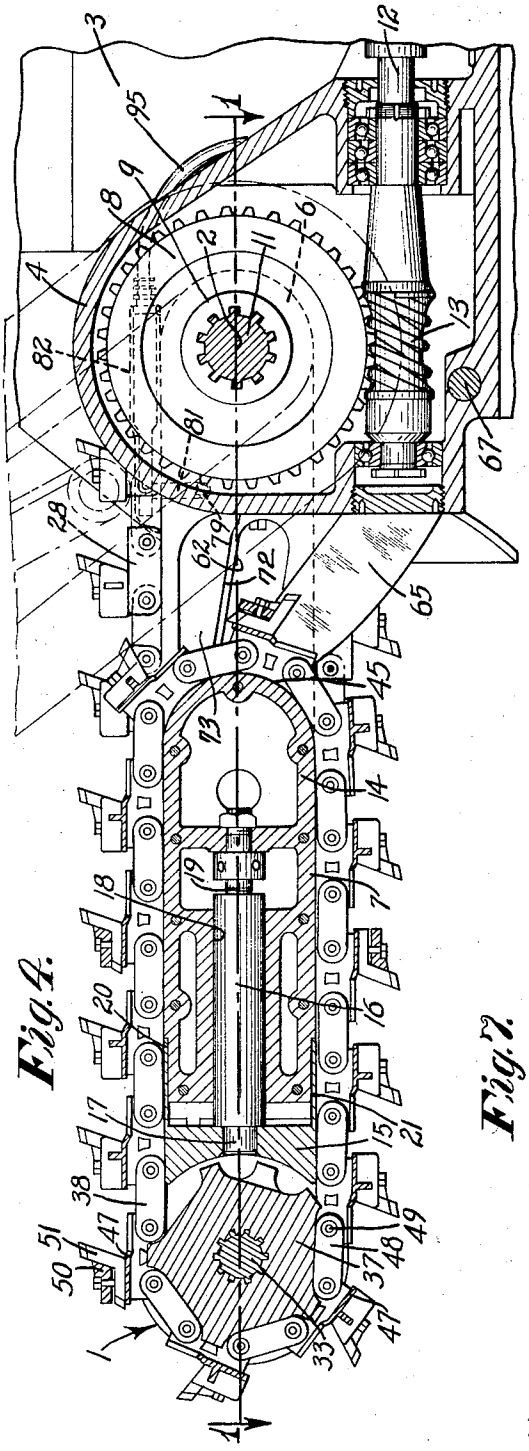


Fig. 4.

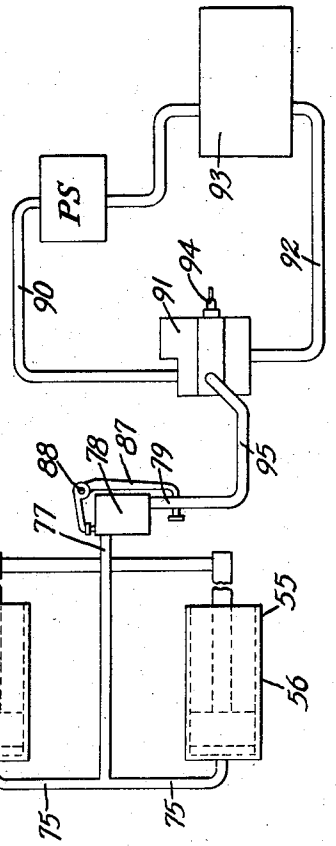


Fig. 8.

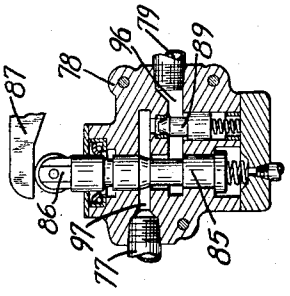


Fig. 7.

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2,867,427

DISINTEGRATING MECHANISM FOR LONGWALL CONTINUOUS MINER

John A. Russell, Sydney, Nova Scotia, Canada, and Joseph R. Bouillé, Greensburg, Pa., assignors to Joy Manufacturing Company, Pittsburgh, Pa., a corporation of Pennsylvania

Continuation of application Serial No. 131,095, December 5, 1949. This application January 9, 1957, Serial No. 637,507, now abandoned.

16 Claims. (Cl. 262—28)

This invention relates to vein-attacking and disintegrating mechanism and more particularly to the vein-attacking and disintegrating mechanism of a continuous mining apparatus whereby coal or other mineral may be dislodged from a solid coal seam or mine vein.

In a continuous mining apparatus of a known type a vein-attacking and disintegrating mechanism is swingable in vertical planes to effect tearing or ripping of the coal or other mineral from a solid coal seam or mine vein and embodies a swingable jib frame or bar structure having vein-attacking and disintegrating elements guided for orbital movement thereabout. The jib frame is adapted to be swung in vertical planes by power devices whereby the attacking and disintegrating elements may be moved upwardly with sufficient force and at a relatively high rate so that vertical segments of the coal or other mineral are torn out or dislodged in relatively large fragments from the solid instead of producing the relatively fine cuttings which are present when the coal or other mineral is cut with a conventional kerf cutting machine. In such known types of continuous mining apparatus the jib frame of the attacking and disintegrating mechanism may be swung upwardly by power devices mounted on the body of the apparatus externally of the attacking and disintegrating mechanism and connected externally to the swingable frame and the machine body. The mining apparatus with which the present invention is associated is of the longwall type and is movable in an endwise direction along a longwall face and operates to rip out or dislodge the coal or other mineral inside the longwall face at one end of the latter to provide an opening or passageway of such size and shape as to receive the body of the apparatus as mining progresses, as is fully disclosed in a copending application of J. A. Russell, J. R. Bouille, W. M. Sutherland and C. A. Hamlin, Serial No. 131,094 now Patent No. 2,721,067, filed of even date with applicants' abandoned parent application Serial No. 131,095, filed December 5, 1949.

In such a longwall type of continuous mining apparatus due to the location and path of movement of the attacking and disintegrating mechanism with respect to the longwall face such external swinging means for the swingable jib frame of the attacking and disintegrating mechanism is not practical since the attacking and disintegrating mechanism must be of such width and the attacking and disintegrating elements must so extend completely thereacross as to dislodge the coal or other mineral to form a space or passageway in the coal seam or mine vein inside of the longwall face of sufficient width to receive the body of the apparatus thereby making it impossible to connect the external power devices to the exterior of the swingable jib frame. The present invention contemplates improvements over the continuous mining apparatus of the known type above referred to in that the power devices for swinging the attacking and disintegrating mechanism are embodied within the attacking and disintegrating mechanism inside of the orbital path of the attacking and disintegrating elements thereof and are connected to the body of the apparatus through connections located entirely within lateral limits of the attacking and disintegrating mechanism. Thus by arranging the power devices within the swingable jib frame of the attacking and disintegrating mechanism extreme lateral compactness is obtained which is essential in a continuous mining apparatus of the longwall type. In accordance with the present invention an automatic control device mounted on the swingable jib frame is associated with the attacking and disintegrating mechanism whereby the power devices for swinging the jib frame of the attacking and disintegrating mechanism are automatically controlled to interrupt swing when a predetermined limit of swinging travel of the attacking and disintegrating mechanism is reached.

An object of the present invention is to provide an improved vein-attacking and disintegrating mechanism for a mining apparatus whereby the coal or other mineral may be ripped out or dislodged from the solid coal seam or mine vein. Another object is to provide an improved attacking and disintegrating mechanism for a continuous mining apparatus of the longwall type wherein a passageway is formed in the coal seam or mine vein inside of the face of such size and shape as to receive the body of the apparatus as the latter is advanced along the face as mining progresses. A further object is to provide an improved swinging means for the attacking and disintegrating mechanism of a mining apparatus. Yet another object is to provide an improved swinging means for the attacking and disintegrating mechanism of a continuous mining apparatus of the above character wherein the power devices of the swinging means are enclosed within the swingable jib frame of the attacking and disintegrating mechanism and wherein the swinging means embodies connections extending from the power devices within the frame downwardly from the frame into connection with the body of the apparatus. Still another object is to provide an improved attacking and disintegrating mechanism embodying a swingable jib frame about which attacking and disintegrating elements are guided for orbital movement and embodying improved swinging means for the jib frame including power devices arranged within the frame inside of the orbit of the attacking and disintegrating elements and connections between the power devices and the body of the apparatus, whereby extreme compactness is obtained. Still another object is to provide an improved automatic control device mounted within the jib frame and associated with the swinging means whereby the flow of operating medium to the power devices is automatically cut off when the limit of swinging travel of the attacking and disintegrating mechanism in one direction is reached. These and other objects and advantages of the invention will, however, hereinafter more fully appear.

This application is a continuation of application Serial No. 131,095, filed December 5, 1949 and now abandoned.

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 horizontal section taken substantially on line 1—1 of Fig. 4, illustrating details of the attacking and disintegrating mechanism.

Fig. 2 is a longitudinal vertical section taken substantially on the planes of line 2—2 of Fig. 1.

Fig. 3 is a cross section taken on the planes of line 3—3 of Fig. 1.

Fig. 4 is a longitudinal vertical section taken on the planes of line 4—4 of Fig. 1.

Fig. 5 is a detail section illustrating the automatic control valve for the hydraulic swing cylinders, the view taken on line 5—5 of Fig. 3.

Fig. 6 is a vertical section taken on line 6—6 of Fig. 1, looking toward the side of the control valve shown in Fig. 5.

Fig. 7 is an enlarged section taken through the control valve shown in Figs. 5 and 6.

Fig. 8 is a diagrammatic view of the hydraulic system associated with the automatic control valve and the hydraulic swing cylinders.

The improved vein-attacking and disintegrating mechanism is generally designated 1 and is embodied in a continuous mining apparatus of the longwall type which is fully disclosed in the copending application, Serial No. 131,094, above referred to. Evidently, various features of the attacking and disintegrating mechanism may be embodied in mining apparatus of other types.

The attacking and disintegrating mechanism or so called jib or disintegrating head 1 is pivotally mounted at 2 on a body 3 to swing in vertical planes with respect thereto. Carried by the forward portion of the body at its opposite sides are gear casings 4 which have inwardly directed circular hollow bearing or trunnion portions 5 which are surrounded and pivotally engaged by circular bearing portions 6 of a swingable jib frame or bar structure 7. Enclosed within the gear casings are worm wheels 8 having their hubs 9 journaled in bearings 10 suitably supported within the gear casings. Supported within and keyed to the hubs 9 of the worm wheels and extending axially through the hollow trunnions 5 is a transverse horizontal drive shaft 11. Motor driven shafts 12 extend longitudinally along the opposite sides of the body and are suitably journaled in the gear casings and these shafts have secured thereto and drive worms 13 (Fig. 4) meshing with the worm wheels 8 and likewise enclosed within the gear casings. Thus, the transverse drive shaft 11 is driven at its opposite ends through the worm gearings 8, 13 and drive shafts 12. The swingable jib frame or bar structure 7 has a rearward frame portion 14 with which the bearing portions 6 are integrally formed and an adjustable outer frame portion 15 to which parallel guide rods 16 are rigidly secured at 17. These guide rods are slidably received in parallel longitudinally extending guide bores 18 formed in the rearward portion 14 of the jib frame. Screw and nut devices 19 are arranged between the rearward frame portion 14 and the guide rods 16 for adjusting the outer frame portion 15 longitudinally relative to the rear frame portion 14 for a purpose to be later explained. The outer portion of the rear frame portion 14 has guiding surfaces 20 with which parallel guide portions 21 of the outer frame portion 15 slidingly engage as fully shown in Fig. 2. Outer side plates 23 detachably secured to the outer sides of the rearward frame portion 14 of the jib frame are formed with openings 24 having removable covers 25 whereby access to the screw and nut devices 19 may be afforded. Splined at 26 to the shaft 11 are chain sprockets 27 which engage and drive endless attacking and disintegrating chains 28. Surrounding the shaft 11 and arranged intermediate the chain sprockets are spacing sleeves 29. The attacking and disintegrating chains 28 move in parallel vertical orbits about the jib frame and the latter is provided with suitable guideways in which the chains may be circulated and the chains at their forward portions pass around and drive chain sprockets 31 splined at 32 to a transverse shaft 33 herein arranged parallel with the shaft 11 and journaled within the adjustable outer frame portion 15 of the jib frame. The shaft 33 is supported within sleeves 34 which are journaled in bearings 35 supported in bores 36 formed in the outer frame portion 15. Splined to the outer ends of the shaft 33 are chain sprockets 37 which engage and drive side attacking disintegrating chains 38 which move about the jib frame in vertical orbits parallel with the orbits of the intermediate disintegrating chains 28. The frame portion 15 has spaced projections 39 arranged intermediate the sprockets 31 and 37, and these projections support the bearings 35 for the shaft 33. The sprockets 37 are secured as by screws 41 (Fig. 1) to the ends of the shaft 33 and these screws serve to prevent axial displacement of the shaft in its mounting on the jib frame. Lubricating nipples 42 connected through suitable passages with the shaft bearings, are secured to the ends of the shaft and extend laterally into elongated openings 43 in the side plates 23. The side disintegrating chains 38 are of less length than the intermediate chains 28 and at their rearward portions engage and pass around semi-circular guide surfaces 45 on the rearward jib frame portion 14 (Figs. 1 and 4). By adjusting the screw and nut devices 19 the outer jib frame portion 15 may be adjusted longitudinally relative to the rear frame portion 14 to vary the tension of the disintegrating chains 28 and 38. The disintegrating chains each comprise a series of chain blocks 47 pivotally connected to strap links 48 by hinge pins 49, and the chain blocks have lateral lugs 50 for supporting disintegrating elements 51 which are herein in the form of cutter bits or picks. In the construction shown the chain sprockets 27, 31 and 37 each has sprocket teeth which are arranged to engage the chain elements to effect drive of the chains, and the structures of these disintegrating chains may be similar to that disclosed in a copending application to A. Lee Barrett and L. G. Rollins, Serial No. 108,938, filed August 6, 1949, now Patent No. 2,650,813, and likewise owned by applicants' assignee. The particular structure of the disintegrating teeth and their mountings on the disintegrating chains may be similar to those disclosed in copending applications to Joseph F. Joy, Serial No. 57,047, filed October 28, 1948, and now abandoned, and Serial No. 84,129, filed March 29, 1949, now Patent No. 2,676,005, also both owned by applicants' assignee. The particular structure of the chain sprockets is the invention of A. Lee Barrett and L. G. Rollins fully disclosed in application Seral No. 129,658 filed November 26, 1949, now Patent No. 2,602,343 and is therefore not disclosed in detail herein. Thus, when the longitudinal shafts 12 are suitably driven the disintegrating chains may be rapidly circulated in their orbits about the jib frame through the worm gearing 13, 8, transverse shaft 11 and chain sprockets 27, 31 and 37, with the bottom runs of the disintegrating chains moving forwardly and outwardly and the top runs of the chains moving rearwardly. Associated with the adjustable outer portion 15 of the jib frame of the attacking and disintegrating mechanism is means for supplying spray water to the working face of the mine vein or coal seam in proximity to the zone of action of the disintegrating elements 51 to allay the dust in a manner fully disclosed in the copending application Russell et al., Serial No. 131,094 above referred to and since this water spray means does not per se enter into the present invention further disclosure thereof herein is unnecessary.

The improved means for swinging the attacking and disintegrating mechanism in vertical planes about its pivot 2 comprises hydraulic rams or jacks 55 and the associated mechanism now to be described. The rams are herein single acting and comprise parallel cylinders 56 arranged longitudinally of and spaced equidistantly from the longitudinal center of the swingable jib frame 7, as shown in Figs. 1 and 2. These cylinders are located within the orbits of the disintegrating chains and are enclosed within the jib frame as shown, at the inner sides of the guide rods 16. Contained in these cylinders are reciprocable pistons 57 to which piston rods or pitman 58 are pivotally connected by pivot pins at 59, on axes parallel to the axis of the pivot 2 and these piston rods are pivotally connected at their rearward ends at 60 to a transverse horizontal bar or rod 61 herein passing through suitably shaped longitudinal slots 62 in the jib frame. The rod 61 is secured at its ends as by pins 63 within bores 64 in the forward ends of connecting rods or reaction links

65. These links 65 are located at the outer sides of the rearward jib frame portion 14 and extend downwardly through side recesses 66 in the rear part of the jib frame and are pivotally connected at their rearward ends to pivot pins 67 carried by brackets 68 integral with the gear casings 4 secured to the machine body 3 and located beneath pivot 2 as shown in Fig. 2. Rollers 70 are rotatably mounted on the cross rod 61 and a spacing sleeve 71 surrounds the rod between these rollers as shown in Fig. 1. These rollers engage inclined bottom surfaces 72 of wedge or cam blocks 73 secured as by screws 74 to the bottom of the top wall of the jib frame. The surfaces 72 are inclined with respect to the path of bodily movement of the rollers and are engaged by the latter. Liquid under pressure may be supplied to the forward ends of the ram cylinders 56 through branch pipes 75 arranged within the jib frame and extending rearwardly to a T 76 (Fig. 5) which is connected by a pipe 77 to a control valve device 78 carried by the jib frame as shown in Figs. 5 and 6. A supply pipe 79 is connected to the valve device and extends laterally through an opening 80 (Fig. 1) in the adjacent side of the jib frame and is connected to a pipe 81 communicating with the interior of a chambered member 82 secured to the top of the adjacent bearing portion 6 of the jib frame (Fig. 4). The source of liquid supply to the pipe 79 will later be described. The control device 78 is of a conventional design and includes a slide valve 85 (Fig. 7) having a stem 86 which is engaged by an operating lever 87 pivoted at 88 on the jib frame. The valve of the control device is normally open and when liquid under pressure is supplied thereto through the supply pipe 79 it may flow past the valve through pipe 77 and pipes 75 to the forward ends of the ram cylinders 56 causing the pistons 57 to move rearwardly thereby moving the rollers 70 along the wedging surfaces 72, swinging therewith the links 65, to swing the jib frame upwardly about its pivot. When the limit of upward travel of the jib frame is reached as indicated by the upper dotted line position shown in Fig. 4, the sleeve 71 on the cross rod 61 engages the lever 87 swinging the latter about its pivot to a position wherein the control valve is closed cutting off further liquid flow to the ram cylinders. When the supply pipe 79 is vented liquid may flow from the ram cylinders past a spring loaded check valve 89 embodied in the control device (Fig. 7) and through the pipe 79 back to the liquid source so that the jib may be lowered at a controlled rate. The control means for the liquid supply to and the vent from the ram cylinders will now be described.

As shown diagrammatically in Fig. 8 a conduit 90 leads to any suitable source of supply of liquid under pressure designated PS and is connected to the pressure passage of a valve box 91 of a conventional control valve mechanism, and the discharge passage of the valve box is connected by a return conduit 92 back to a liquid tank 93. The valve box has a bore containing a conventional slide valve 94 and the bore containing this valve is connected by a conduit 95 to the supply pipe 79 through which liquid under pressure may flow to the automatic control valve 78 and through the pipe 77 to the pipes 75 connected to the cylinders of the hydraulic rams 55. The slide valve 94 may be positioned to connect the conduit 95 with either the pressure passage or the discharge passage of the valve box to effect liquid supply to the cylinders 56 or to effect venting of the latter.

When the attacking and disintegrating mechanism 1 is swung downwardly about its pivot to its lowered position at the floor or pavement level it may be fed forwardly in the manner fully disclosed in the copending Russell et al. application Serial No. 131,094 mentioned above to sump the outer end portion thereof into the coal seam or mine vein and when the attacking and distintegrating mechanism is in its sumped position the slide valve 94 may be positioned to supply liquid under pressure through the conduit 95 and supply pipe 79 to the control valve device 78 and through passage 96 (Fig. 7) past the slide valve 85 and through passage 97 to the pipe 77 and thence through the branch pipes 75 to the forward ends of the cylinders 56 of the hydraulic rams 55 causing the pistons 57 to be moved rearwardly in their cylinders thereby moving the rollers 70 along the wedging surfaces 72, swinging therewith the reaction links 65, to swing the jib frame upwardly about its pivot. When the limit of upward travel of the jib frame is reached and the upward dislodging operation of the attacking and disintegrating mechanism is completed the leved 87 of the control valve device is actuated by the cross rod 61 to move the valve 85 to its closed position cutting off further liquid flow to the ram cylinders. When the slide valve 94 is positioned to vent the supply pipe 79 liquid may flow from the ram cylinders through passage 97 past the spring loaded check valve 89 to the passage 96 which is at that time connected to the return conduit 92 so that the jib may be lowered at a controlled rate under the control of the slide valve 94. When the attacking and distintegrating mechanism is in its raised position at the level of the mine roof it may be retracted from the coal seam or mine vein in a manner likewise fully disclosed in the copending Russell et al. application Serial No. 131,094 referred to above.

As a result of this invention an improved vein-attacking and distintegrating mechanism is provided whereby the coal or other mineral may be mechanically dislodged completely from a solid coal seam or mine vein and in a substantially uninterrupted manner, without the need of separate steps of cutting, drilling and blasting. By the provision of a vein-attacking and distintegrating mechanism which is extremely compact, both vertically and laterally, the same is particularly adapted to use with a longwall continuous mining apparatus in accordance with the longwall system of mining. By the provision of the swinging means for the attacking and distintegrating mechanism of the apparatus with the swinging cylinders arranged within the swingable jib frame, the attacking and distintegrating mechanism is made relatively compact, well adapted to use in the narrow spaces encountered in the longwall system of mining. Due to the novel construction and design of the attacking and distintegrating mechanism the latter is of sufficient width with the attacking and distintegrating elements thereof extending completely thereacross so that a passageway may be formed in the vein or seam inside of the longwall face of such size and such shape as to admit the body of the apparatus as the latter is advanced along the longwall face. By arranging the swinging cylinders within the swingable jib frame not only is extreme compactness obtained but also the swinging means is protected from possible damage due to engagement with the dislodged coal or other mineral during the mining operation. By the provision of the automatic control valve mounted directly on the jib frame and actuated by elements of the swinging means the swinging travel of the attacking and distintegrating mechanism in one direction is automatically controlled. Other manners of use and advantages of the improved attacking and distintegrating mechanism will be clearly apparent to those skilled in the art.

While there is 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 we claim as new and desire to secure by Letters Patent is:

1. In combination, a body, a vein-attacking and disintegrating mechanism pivotally mounted on said body to swing about a pivot on the latter and comprising a swingable frame pivotally supported on said body and having disintegrating means guided in non-circular orbits

thereon for orbital movement in the planes of swing of said disintegrating mechanism, and mechanism for swinging said frame relative to said body including a strut member pivotally connected to said body in offset relation to the pivot of said frame and having an end guided for movement on said frame, generally longitudinally of the latter, and motor means on said frame within the projection of said frame lying within said orbits and including a movable motor element for moving said end of said strut member longitudinally of said frame to swing said strut member about its pivotal connection with said body, said disintegrating means surrounding said motor means.

2. In combination, a body, a vein-attacking and disintegrating mechanism pivotally mounted on said body to swing in vertical planes with respect thereto and comprising a swingable frame and disintegrating means guided for orbital movement about said frame, and a fluid operated mechanism for swinging said attacking and disintegrating mechanism about its pivot comprising a fluid cylinder supported by said frame between the sides of the latter and within the orbit of said disintegrating means said cylinder containing a reciprocable piston, said frame having a bottom opening, and connections extending between said piston and said body, and including a reaction link extending downwardly through said bottom opening and pivotally connected to said body beneath the pivot of said attacking and disintegrating mechanism to swing in vertical planes.

3. In combination, a body, a vein-attacking and disintegrating mechanism pivotally mounted on said body to swing in vertical planes with respect thereto and comprising a swingable frame and disintegrating means guided for orbital movement about said frame, and a fluid operated mechanism for swinging said attacking and disintegrating mechanism about its pivot comprising a fluid cylinder supported by said frame within the orbit of said disintegrating means and containing a reciprocable piston, and connections extending between said piston and said body, and including a link pivotally connected at one end to said body to swing in vertical planes, a piston rod pivotally connected at one end to said piston and at its other end to the opposite end of said link, a roller mounted at the pivotal connection between said link and said piston rod, and a wedge surface on said frame inclined with respect to the path of travel of said roller and with which said roller engages.

4. In combination, a body, a vein-attacking and disintegrating jib pivotally mounted on said body to swing in vertical planes relative thereto and adapted to dislodge and disintegrate the mineral of a solid mine vein, said jib comprising a hollow jib frame provided with laterally located openings, and means for swinging said attacking and disintegrating jib about its pivot comprising a fluid motor including relatively reciprocable cylinder and piston elements arranged within and extending lengthwise of said frame in a direction extending radially of the frame pivot, and operative power transmitting connections between the reciprocable element of said motor and said body and actuated by movement of said motor element during its reciprocation to effect swinging of said jib frame, said power transmitting connections including elements extending downwardly from said frame through said laterally located openings into contact with said body.

5. In combination, a body, a vein-attacking and disintegrating mechanism pivotally mounted on said body to swing in vertical planes relative thereto, said mechanism adapted to dislodge and disintegrate the mineral of a solid mine vein, fluid operated motor means carried by and enclosed within said attacking and disintegrating mechanism, means including a transmission member guided for movement longitudinally of said frame and actuated by said motor means for swinging the latter about its pivot, means for supplying pressure fluid to said motor means, and a control valve mechanism carried by said attacking and disintegrating mechanism and actuated by said guided transmission member for automatically interrupting the flow of fluid to said motor means when the limit of swing of said attacking and disintegrating mechanism in one direction is reached.

6. In combination, a body, mine vein-attacking and disintegrating mechanism pivotally mounted on said body to swing in vertical planes with respect thereto, said mechanism comprising a swingable frame and disintegrating means guided for orbital movement in vertical planes about said frame, and motor operated mechanism for swinging said attacking and disintegrating mechanism about its pivot comprising parallel cylinders mounted in said frame within the orbit of said disintegrating means and extending longitudinally of said frame, pistons reciprocable in said cylinders respectively, a transverse rod, said frame having longitudinal openings in which said rod is movable, piston rods connecting said pistons to said rod, links between the ends of said rod and said body, said links pivoted to swing in vertical planes about an axis parallel to the pivotal axis of said attacking and disintegrating mechanism, rollers rotatably mounted on said rod, and wedge surfaces on said frame and inclined with respect to the path of movement of said rod and with which said rollers engage.

7. In combination, a body, mine vein-attacking and disintegrating mechanism pivotally mounted on said body to swing in vertical planes with respect thereto, said mechanism comprising a swingable frame and disintegrating means guided for orbital movement in vertical planes about said frame, and motor operated mechanism for swinging said attacking and disintegrating mechanism about its pivot comprising parallel cylinders mounted in said frame within the orbit of said disintegrating means and extending longitudinally of said frame, pistons reciprocable in said cylinders respectively, a transverse rod, said frame having longitudinal-openings in which said rod is movable, piston rods connecting said pistons to said rod, links between the ends of said rod and said body, said links pivoted to swing in vertical planes about an axis parallel to the pivotal axis of said attacking and disintegrating mechanism, rollers rotatably mounted on said rod, and wedge surfaces on said frame and inclined with respect to the path of movement of said rod and with which said rollers engage, and means for supplying pressure fluid to said cylinders including a normally open control valve device mounted on said frame and having operating means actuated by said rod for moving said valve device to closed position when the limit of swinging travel of said attacking and disintegrating mechanism in one direction is reached.

8. A vein-attacking and disintegrating mechanism for disintegrating the mineral of a solid mine vein, comprising a swingable jib frame pivotally mounted to swing in vertical planes about a horizontal axis, said frame having a rearward part and an outer part guided for longitudinal adjustment relative to said rear part, spaced parallel guiding means located near the outer sides of said frame and secured to said outer part and slidingly engaging said rear part, devices cooperating with said guiding means and said rear frame part for adjusting said outer part relative to said rear part, endless disintegrating chains guided on said frame for circulation in parallel vertical orbits, said outer frame part being adjustable relative to said rear part to vary the tension of said chains, and power operated means for swinging said frame in vertical planes about its pivot comprising extensible power devices arranged in parallel relation on said rear frame part intermediate and parallel with said guiding means with the outer portions of said power devices disposed outwardly of said jib frame with respect to the inner portions of said guiding means, said power devices arranged inside of said frame within the orbits of said chains.

9. A vein-attacking and disintegrating mechanism for disintegrating the mineral of a solid mine vein, compris-

ing, in combination, a body, a swingable jib frame having parallel longitudinally extending guideways, endless disintegrating chains guided for circulation in orbital paths about said guideways, and motor operated means for swinging said frame comprising a fluid cylinder arranged within and extending longitudinally of said frame, said cylinder located within the orbits of said chains, a fluid actuated piston contained in said cylinder, a member guided for movement relative to said frame, a piston rod connecting said piston to said guided member, and a link pivotally connected to said guided member and extending outwardly from said frame intermediate certain of said chain guideways, said link having pivotal connection with said body at a point spaced from the frame pivot.

10. In combination, a supporting body, a disintegrating apparatus for dislodging mineral from a solid mine vein including a frame projecting from a pivot connecting the inner end of said frame to said body and a series of disintegrating elements mounted on said frame, and means for swinging said frame about its pivot including power actuated extensible means disposed lengthwise of said frame within the lateral boundaries thereof and within the longitudinal limits of said disintegrating elements, said swinging means operating between said body and said frame for effecting swinging movement of the latter about the pivot, and power transmitting connections between said extensible means and said body, said power transmitting connections including a member movable upon extension and retraction of said extensible means and a reaction link pivotally connected between a point on said body remote from the axis about which said frame swings and said movable member, and means for guiding said member for movement along said frame.

11. A combination as set forth in claim 10 wherein said extensible means comprises an element fixed within said frame and an element movable with respect thereto under the influence of power medium, said movable element being connected to said reaction link, a linkage mounting roller means, and cam means is provided on said frame with which said roller means cooperates whereby upon movement of said element said roller means is actuated to swing said frame about its pivot.

12. In combination, a body, a vein-attacking and disintegrating jib pivotally mounted on said body to swing in vertical planes relative thereto and adapted to dislodge and disintegrate the mineral of a solid mine vein, said jib comprising a hollow jib frame provided with laterally located openings, and means for swinging said attacking and disintegrating jib about its pivot comprising a fluid motor including relatively reciprocable cylinder and piston elements arranged within and extending lengthwise of said frame and arranged with its longitudinal axis disposed in a direction extending radially of the frame pivot, said cylinder and piston elements disposed between the lateral limits of said jib frame, and operative thrust transmitting connections between the reciprocable element of said motor and said body and actuated by movement of said motor element during its reciprocation to effect swinging of said jib frame, said thrust transmitting connections including elements extending downwardly from within said frame and outwardly through said laterally located openings into contact with said body.

13. In combination, a disintegrating apparatus for dislodging mineral from a solid mine vein including at each side thereof orbitally moving disintegrating elements and a frame providing elongated guiding means determining the shape of said orbits and by which said elements are guided, said disintegrating apparatus swingable about an axis near the rearward ends of said orbits of said disintegrating elements and said guiding means, a support on which said disintegrating apparatus is pivotally mounted, and means for swinging said disintegrating apparatus about said axis including motor devices included within a space within said frame and bounded laterally by said guiding means and circumferentially by a surface formed by the movement of a straight lined generatrix extending between said orbits and moved in a path conforming to said orbits, said motor devices disposed between the opposite limits of said distintegrating elements and including movable motor elements, and operative thrust transmitting connections extending outwardly from within said frame between said movable elements of said motor devices and said support including a connection engaging the latter.

14. In combination, a supporting frame, a disintegrating head pivotally mounted on said frame for up and down swinging movement about a horizontal axis, said head having a frame including a pair of horizontally spaced vertically disposed side guide members about which endless disintegrating chains are guided for orbital circulation and orbitally movable disintegrating means extending between and carried by said side guide members at the outer portion of said head, said disintegrating means cooperating with said disintegrating chains in the disintegration of the mineral of a solid mine vein, and extensible motor means connected between said head frame and said supporting frame and swingable in vertical planes with said head frame, said motor means arranged with the major portions thereof disposed between said side members in a space included within the horizontal projection of the peripheral orbits of said disintegrating chains between said side guide members, said motor means extending generally longitudinally of said head frame and operable upon extension thereof to swing said head about its pivotal axis.

15. A combination as set forth in claim 14 wherein said motor means includes relatively reciprocable fluid cylinder and piston elements and means providing a pivotal connection between the piston element and said supporting frame in adjacency to the pivotal axis of said head with the pivotal axis of said pivotal connection disposed in parallelism with said horizontal head axis.

16. A combination as set forth in claim 14 wherein said motor means comprises relatively reciprocable fluid cylinder and piston elements, said cylinder element connected to said head frame and said piston element having pivotal connection with said supporting frame.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,867,427 January 6, 1959

John A. Russell et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the heading to the printed specification, lines 8, 9, and 10, for "Continuation of application Serial No. 131,095, December 5, 1949. This application January 9, 1957, Serial No. 637,507, now abandoned." read -- Continuation of application Serial No. 131,095, December 5, 1949, now abandoned. This application January 9, 1957, Serial No. 637,057. --; column 6, line 11, for "leved" read -- lever --.

Signed and sealed this 21st day of April 1959.

(SEAL)
Attest:

KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents