Oct. 18, 1966 W. SILKS 3,279,856

CORE BREAKER FOR RIPPER TYPE MINER

Filed Nov. 18, 1963

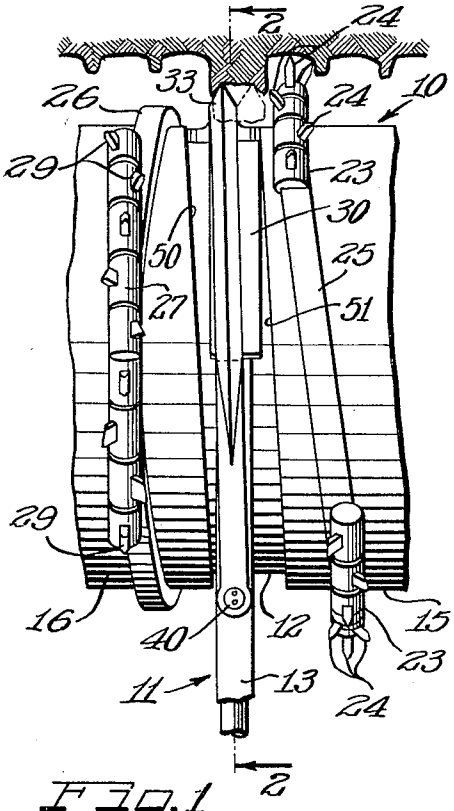

Fig. 1

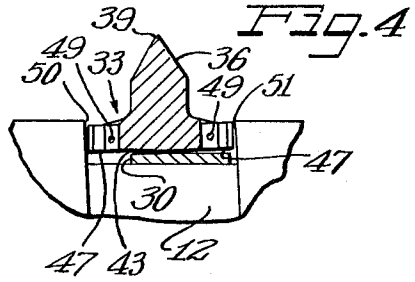

Fig. 4

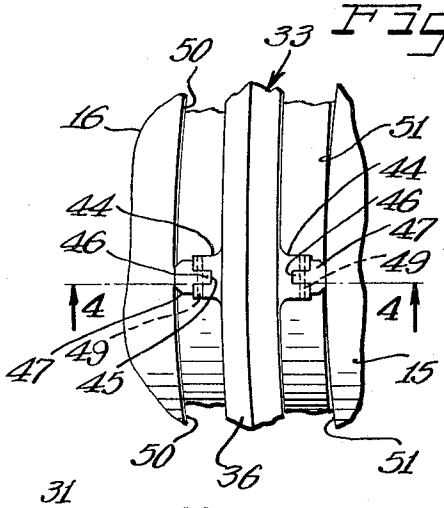

Fig. 3

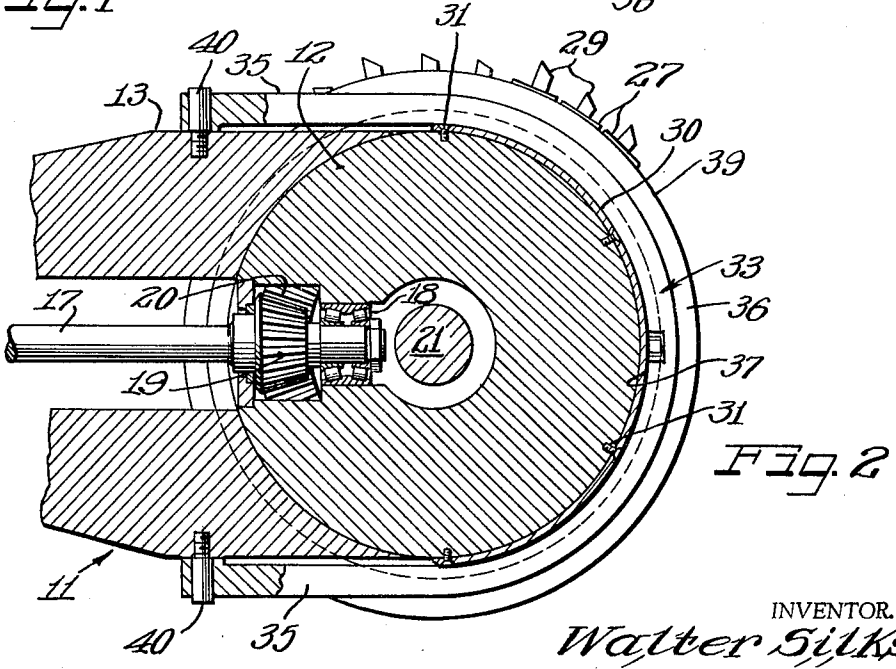

Fig. 2

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CORE BREAKER FOR RIPPER TYPE MINER

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This invention relates to improvements in continuous mining machines of the ripper type and more particularly relates to an improved form of core splitter therefor.

A principal object of the present invention is to improve upon ripper types of continuous mining machines having a cutter drum having rows of bits extending thereabout, by providing a novel and improved means movable between certain rows of bits for breaking down the cores left therebetween.

Another object of the invention is to provide an improved form of sectional cutter drum for continuous mining machines of the ripper type in which core splitters are provided to split the cores left between the sections of the drum and are reciprocably moved back and forth during rotation of the drum.

A further object of the invention is to provide an improved form of ripper type of continuous mining machine having a vertically movable sectional cutter drum rotatably supported between the sections of the drum in which reciprocably movable core splitters are provided between the sections of the drum and are moved back and forth during rotation of the drum, to split the core between the sections of the drum.

A still further object of the invention is to provide an improved form of continuous mining machine having a vertically movable sectional rotary cutter drum supported in advance of the machine between the sections of the cutter drum, in which the support means for the sections of the cutter drum have core splitter means pivotally mounted thereon and conforming generally to the form of the drum, and in which a camming actuating connection is provided between the sections of the cutter drum and the core splitter means, to move the core splitter means back and forth during rotation and advance of the cutter drum to perform a mining operation.

These and other objects of the invention will appear from time to time as the following specification proceeds and with reference to the accompanying drawings wherein:

FIGURE 1 is a fragmentary top plan view of two adjacent drum sections of a cutter drum for a ripper type continuous mining machine, partially showing a support for adjacent drum sections, with a core splitter means constructed in accordance with the principles of the present invention mounted on the drum sections;

FIGURE 2 is a partial fragmentary sectional view taken substantially along line 2—2 of FIGURE 1;

FIGURE 3 is an enlarged fragmentary front end view of the drum shown in FIGURES 1 and 2 and illustrating the camming connection for reciprocably moving the core splitter means back and forth during the operation of mining; and

FIGURE 4 is a partial fragmentary sectional view taken substantially along line 4—4 of FIGURE 3.

In the embodiment of the invention illustrated in the drawing, I have shown in FIGURES 1 and 2 a portion of one end portion of a cutter drum 10 for a continuous mining machine of the ripper type. The cutter drum 10 is a sectional drum as shown and described in application Serial No. 277,540 filed by Richard C. Lundquist on May 2, 1963, now Patent No. 3,157,438 dated November 17, 1964, so need not be shown or described in detail. The cutter drum 10 is supported intermediate its ends on

spaced supports 11 including cylindrical housings 12 extending forwardly of angularly movable support arms 13, transversely pivoted to the main frame (not shown) of the machine and extending in advance thereof, as shown in the aforementioned Lundquist application Serial No. 277,540. The cylindrical housing 12 forms a support for the adjacent ends of an inner cutter drum 15 and an outer cutter drum 16 and extends within adjacent ends of said drum in a manner similar to that shown and described in the Lundquist application Serial No. 277,540, now Patent No. 3,157,438. The cylindrical housing 12 also forms a bearing support means for the forward end portion of a drive shaft 17 on bearings 18. The drive shaft 17 has a bevel pinion 19 mounted thereon meshing with and driving a bevel gear 20 which may be keyed or otherwise secured to a drive shaft 21 for the drum sections 15 and 16, as in the aforementioned Lundquist application Serial No. 277,540, now Patent No. 3,157,438.

It should here be understood that the drum section 15 is a center drum section and is supported at its opposite ends in cylindrical housings 12 mounted on and projecting from support arms 13 transversely pivoted to the main frame of the machine and that individual drive shafts are journalled in each cylindrical housing 12 and serve to drive opposite ends of the center drum 15 and the two outer drums 16.

The drum section 15 has spaced rows of cutter blocks 23 mounted thereon and having cutter bits 24 projecting therefrom for cutting centrally of said blocks and to each side of center. The cutter blocks 23 are shown as being mounted in clusters on skewed rings 25 as in application Serial No. 325,588 filed by John S. Newton and James S. Kemper on November 22, 1963, and entitled, "Cutter Bit Mounting for Ripper Type Miner," and no part of the present invention so not herein shown or described further.

The outer cutter drum 16 likewise has skewed rings 26 extending from the periphery thereof and forming mounting means for clusters of cutter blocks 27 having cutter bits 29 projecting outwardly therefrom.

Referring now to the improved means of the present invention for splitting and breaking down the cores left between the drum sections 15 and 16 and between the kerfs cut by the adjacent rows of bits 24, 24 and 29, 29, the cylindrical housing 12 has a semi-cylindrical bearing strip 30 extending about the forward end portion thereof and secured to said housing as by machine screws 31, 31. The semi-cylindrical bearing strip forms a bearing member for a reciprocably movable core splitter mounted between the adjacent ends of the drum sections 15 and 16 for movement across the space between said drum sections.

The core splitter member 33 is generally U-shaped in form and has a pair of parallel spaced legs 35 extending along opposite sides of the support arm 13 and has a generally semi-cylindrical core splitter surface 36 extending about the front of the cylindrical housing 12 and having an inner peripheral portion 37 bearing against the bearing member 30. The semi-cylindrical core splitter portion 36 of the core splitter member 33 is shown as having opposite inclined sides diverging from a core splitter peak 39 toward the drum between the drum sections 15 and 16.

The arms 35, 35 are vertically pivoted to opposite sides of the support arm 13 on aligned pivot pins 40, 40, shown as being threaded in opposite sides of the support member 13 and forming a pivotal support for said arms and the core splitter member 33 supporting said arms and core splitter member for movement back and forth between the adjacent ends of the drum sections 15 and 16.

The inner peripheral portion 37 of the core splitter member 33 is shown as having an inner peripheral or bottom surface 43 sloping outwardly in opposite directions from the center of said inner peripheral portion to provide a rocking mounting for the core splitter member 33 on the bearing 30, and thereby accommodate free movement of said core splitter member across the bearing member 30 about the axes of the pivot pins 40.

In FIGURE 3, the front end portion of the core splitter member 33 is shown as having lugs 44 projecting outwardly therefrom in aligned relation with respect to each other. The lugs 44 have a slot 45 formed therein and opening outwardly of said lugs and forming a mounting for a tongue 46, projecting inwardly of a follower 47. The tongue 46 is pivotally connected to the lugs 44 as by pivot pins 49. The followers 47 may be made from a suitable bearing material. The outer follower 47 has bearing engagement with a spiral edge portion 50 of the outer cutter drum 16. The inner follower member 47 has bearing engagement with a spiral end portion 51 of the center cutter drum 15. The spirals of the edge portions 50 and 51 are the same to form with the periphery of the cylindrical housing 12, a spiral slot moving the core splitter member 33 back and forth between the rows of cutter bits 24, 24 and 29, 29 during rotation of the cutter drum.

The cutter bits 24, 24 and 29, 29 are pitched to cut when the cutter drum 10 is moving upwardly from the floor to the roof of a mine. As said cutter drum is rotatably driven and first sumped into the working face of a mine and then advanced upwardly from the floor to the roof of the mine, the core splitter member 33 will be advanced into the core left between the kerfs cut by the rows of bits 24, 24 and 29, 29 to exert a splitting action thereon, and at the same time will be moved back and forth across the core by the camming action of the spiral or helical end faces of the drum sections 15 and 16, to sweep across the core and continue the breaking action on the core as swept thereacross, splitting off the core between the adjacent kerfs and providing a relatively clean face free from cores which may impede the advance or vertical feeding action of the cutter drum 10.

While I have herein shown and described one form in which the invention may be embodied, it may readily be understood that various modifications and variations in the invention may be attained without departing from the spirit and scope of the novel concepts thereof.

I claim as my invention:

1. In a continuous mining machine,

at least one rotary cutter drum rotatable about a horizontal axis extending generally parallel to the working face of a mine,

a support for said cutter drum extending beyond an end thereof and supporting said cutter drum for rotation about said horizontal axis and for vertical movement along a mine face,

said cutter drum having rows of cutter bits extending thereabout and projecting radially therefrom,

and at least one core splitter generally conforming to the periphery of said drum and extending about the forward end portion of said support and pivoted to opposite sides of said support above and below the axis of rotation of said drum for movement about a common axis perpendicular to the axis of rotation of said cutter drum,

said core splitter having a circumferential wedging core splitting face,

and means for moving said core splitter back and forth along said support toward and from said drum, to effect a core splitting operation upon advance of said drum along the working face of a mine during rotation thereof and lateral movement of said core splitter across said support toward and from the end of said drum.

2. The structure of claim 1,

wherein camming means cooperable with the end of said drum effect movement of said core splitter across said support.

3. In a continuous mining machine, a rotary cutter drum supported for rotation about a horizontal axis and vertically moved along a mine face to mine out a working place and comprising a center drum and at least one side cutter drum spaced outwardly from said center drum and coaxial therewith, a support for said drums spacing adjacent ends of said drums apart and supporting said drums for vertical movement along a mine face, and core breaker means for breaking the core in the space between said drums comprising a core splitter having a circumferential core splitting face diverging from a peak and extending about the advance surface of said support between said inner and outer drums, means pivoting said core splitter for movement about a vertical axis spaced rearwardly of the advance face of said drum, and camming means operable by rotation of said drum for reciprocably moving said core splitting face across the space between said drums.

4. In a rotary cutter drum for ripping the coal from a mine face by vertical movement therealong, two spaced aligned drum sections, a support extending into the space between said drum sections and forming a bearing support means therefor, said drum sections each having rows of cutter bits extending thereabout, and core splitting means extending about the forward end portion of said support and generally conforming to the peripheries of said drum sections, pivoted to opposite sides of said support for movement about a common axis perpendicular to the axis of rotation of said cutter drum, said core splitting means having a circumferential core splitting surface and means operated by rotation of said drums for moving said core splitting means back and forth across said support between said drum sections.

5. In a rotary cutter drum for ripping the coal from a mine face by vertical movement therealong, two spaced aligned drum sections, a support extending into the space between said drum sections and forming a bearing support means therefor, said drum sections each having rows of cutter bits extending thereabout, and core splitting means pivoted to said support and having a circumferential core splitting surface movable across said support between said drum sections, and a camming connection between said drum sections and said core spliting means for reciprocably moving said core splitting means in the space between said drum sections.

6. In a rotary cutter drum for ripping the coal from a mine face by vertical movement therealong, two spaced aligned drum sections, a support extending into the space between said drum sections and forming a bearing support means therefor, said drum sections each having rows of cutter bits extending thereabout, and core splitting means in the form of a generally U-shaped strap having a circumferential surface extending about said support and having a peaked core splitting face extending along said circumferential surface and diverging from a peak toward said drums, said strap having legs extending along opposite sides of said support rearwardly of said drum and pivoted thereto, and cam and follower means for reciprocably moving said core splitting means about the axes of pivotal connection of said legs to said support.

7. In a core splitting means for sectional rotary cutter drums for ripper type continuous mining machines having at least two aligned spaced drum sections having rows of cutter bits extending radially therefrom and having a support therefor extending into the space between said drum sections and supporting said drum sections for rotation about a horizontal axis and feeding said drum sections vertically, a core splitting member mounted on said support in the space between said drum sections and extending vertically along the front of said support and having a circumferential peaked core splitting face and

parallel legs extending therefrom along opposite sides of said support, pivot pins connecting said legs to said support rearwardly of said peaked core spliting face, and at least one follower extending from said core splitting member intermediate the ends thereof and having slidable engagement with an adjacent edge of one of said drum sections and reciprocably moved thereby about the axes of said pivot pins.

8. In a core splitting means for sectional rotary cutter drums for splitting the cores between the sections of said drums, said rotary cutter drums having at least two aligned laterally spaced drum sections having rows of cutter bits projecting radially therefrom and a support for adjacent ends of said drum sections extending into the space between said drum sections and supporting said drum sections for rotation about coaxial horizontal axes and feeding said drum sections vertically to rip the coal from the working face of a mine, a core splitting member mounted on said support in the space between said drum sections and having a circumferential vertically extending peaked core splitting face extending around the forward end of said support and parallel legs extending

rearwardly therefrom along the upper and lower sides of said support, vertical pivot pins pivotally connecting said legs to said support for movement about coaxial generally vertical axes, said drum sections having facing camming faces on opposite sides of said core splitting member, and said core splitting member having followers extending laterally therefrom in opposite directions for engagement with said camming faces and reciprocably moving said core splitting member about the axes of said pivot pins by rotational movement of said cutter drum.

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