Aug. 16, 1955 J. S. ROBBINS 2,715,524

BORING HEAD FOR CONTINUOUS MINING MACHINE

Filed June 1, 1954 2 Sheets-Sheet 1

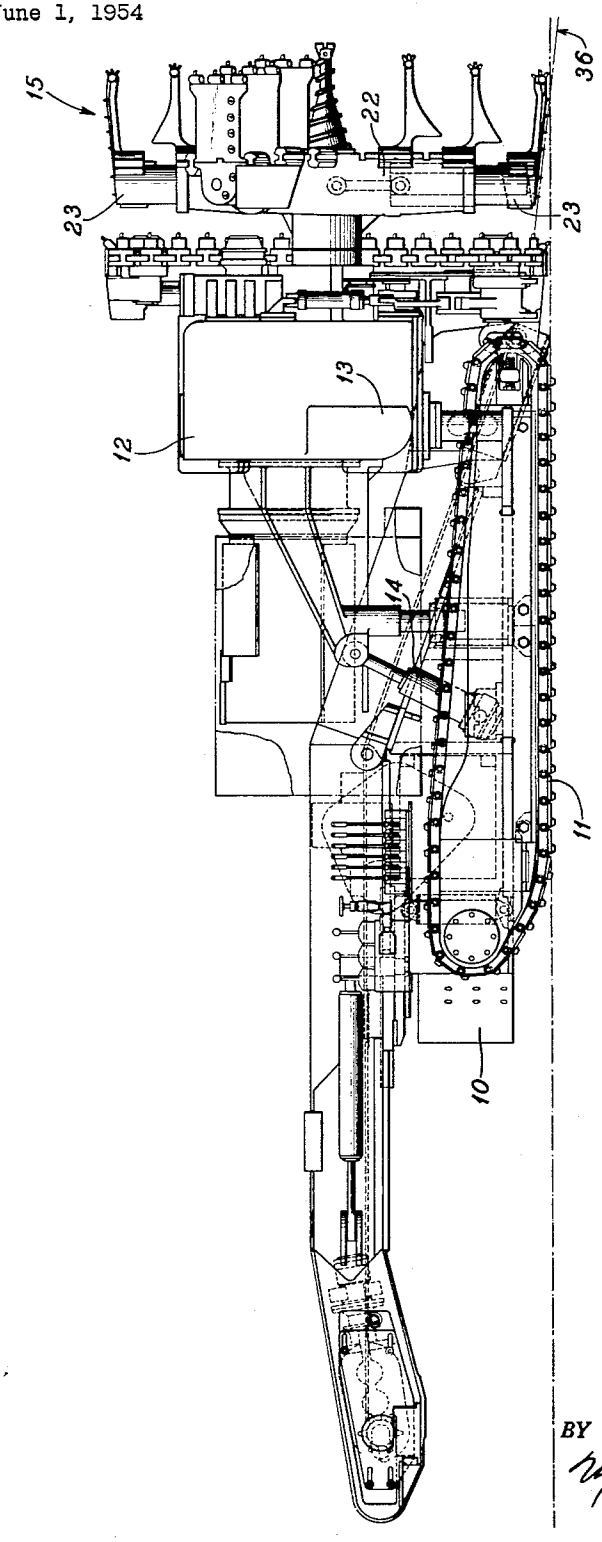


Fig. 1

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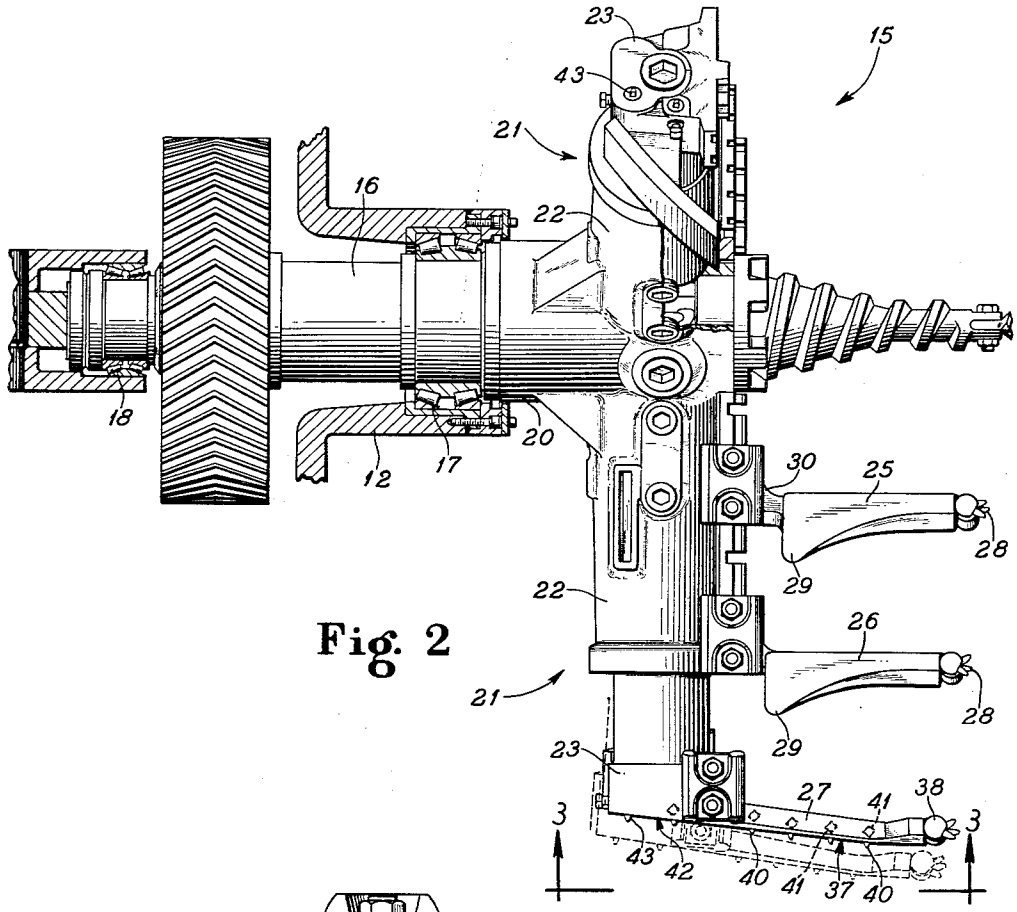


Fig. 2

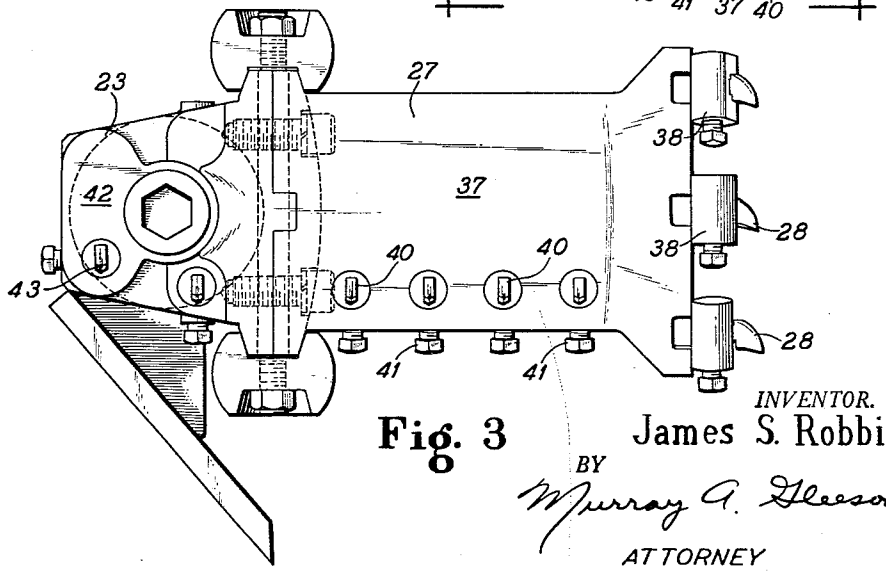


Fig. 3

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BORING HEAD FOR CONTINUOUS MINING MACHINE

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Application June 1, 1954, Serial No. 433,578

2 Claims. (Cl. 262—7)

This invention relates to improvements in mining machines of the boring type especially adapted to cut a bore in advance of the machine. A well-known form of such boring machines is provided with a pair of laterally spaced boring heads, each with a plurality of radial arms, adapted to cut contiguous bores in the working face, and also having auxiliary horizontal upper and lower cutter bars disposed immediately behind the boring heads for trimming the circular bore pattern to produce flat roof and floor surfaces.

Boring heads of the kind above mentioned are usually provided with a plurality of forwardly projecting bit-carrying cutter supports mounted in spaced relation along each radial arm of the head, the arms having the same number and spacing of cutter supports so as to produce a limited number of circular kerfs in the working face, and leaving outstanding cores of mineral between adjacent kerfs, to be dislodged in relatively large lumps by suitable breaker devices also carried by the boring head.

In order to provide desired flexibility of boring action of such boring heads, as well as maneuverability of the mining machine under working conditions in the mine, the mining machine usually has one or more cutter heads suitably mounted on an auxiliary frame which is tiltable with the cutter heads both for vertical and horizontal adjustments relative to the mobile base of the machine, as is shown for instance in my prior application, Serial No. 345,157 filed March 27, 1953.

Among the objects of the present invention is to provide an improved form and arrangement of the outermost cutter support and the cutter bits carried thereby at an outwardly flared angle so as to facilitate the tilting adjustments of he cutter head wih respect to the mining machine during mining operations.

The invention may best be understood by reference to the accompanying drawings, in which:

Figure 1 is a side view of a mining machine constructed in accordance with my invention,

Figure 2 is an enlarged fragmentary detail section taken generally along the axis of rotation of the boring head; and

Figure 3 is an enlarged end view of one of the radial arms of the boring head showing the disposition of the cutting bits thereon.

Referring now to details of the embodiment of my invention, the same is shown in Figure 1 as applied to a mining machine of the general type disclosed in my application bearing Serial No. 345,157 filed March 27, 1953. The mining machine has as its principal elements a main frame **10**, mounted on endless treads **11**, and having an auxiliary frame **12** mounted on the main frame for limited longitudinal and lateral tilting adjustments, by a plurality of jacks **13** and **14**.

A boring head is indicated generally at **15**, mounted as usual for horizontal progression into a working face of a mine. The machine may, as usual, employ two similar boring heads in side by side relation to cut contiguous bores.

Referring to Figure 2, the boring head is suitably mounted on the front end of a drive shaft **16**, suitably journalled in the auxiliary or tilting frame **12** as by bearings **17, 18.**

The boring head has a hub **20** fixed on shaft **16** and having a plurality of similar radial arms **21, 21**, herein three in number.

Each arm **21** includes a hollow generally cylindrical inner arm portion **22** formed integral with the hub and a telescopic end portion **23**. Suitable mechanism (not shown) may be mounted as usual in the hub for effecting simultaneous extension or retraction thereof of all the telescopic end portions to change the maximum working diameter of the boring head.

A plurality of cutter supports are mounted on each radial arm **21** and projecting forwardly from the latter, in the form shown herein, two such cutter supports **25** and **26** being carried on the inner arm portion **22** and a third cutter support **27** being carried at the outer end of the telescoping end portion **23**. Each of such cutter supports has a cluster of cutter bits **28**, suitably arranged as usual in generally arcuate relation along the front edge of each support so as to conform generally with the shape of the circular kerf to be cut by said support. Certain of the cutter supports, as for instance the inner supports **25** and **26** may also have, as usual, outwardly facing wedge or cam surfaces **29** adjacent their bases **30** for dislodging adjacent cores of material left on the working face between the cutter supports.

The cutter supports may be detachably mounted on the arms by suitable fastening means, details of which are omitted as they form no part of the present invention.

Referring now to the novel form and arrangement of the outermost cutter support or bracket **27** on the end of the telescopic end portion **23** of each radial arm, it will be seen in Figures 1 and 2 that this cutter support is widened circumferentially of the head, and extends forwardly for the major part of its length at an angle of several degrees to the axis of rotation of the cutter head. This angle is indicated in Figure 1 by the dot and dash line **36.** Since in the illustrative form of cutter head shown, the radial arms are disposed substantially at right angles to the axis of rotation of said head, the cutter support **27** also extends at an outwardly flaring angle to its radial arm. In particular, the outer face **37** of the cutter support **27** is at a progressively increasing distance from the axis of the cutter head, excepting at the forward end of said support, where it may terminate in a cluster of cutter bit holders **38, 38,** of conventional form for securing cutter bits **28, 28** at varying angles to the support, of sufficient width. In the illustrative form shown three such cutter bit holders are arranged on a slight arc, as usual, along the front edge of the support to conform generally with the circular kerf to be cut thereby. It will be noted, however, that said cutter bits are disposed to cut a circular kerf of sufficient width to admit their support arm **27** into the working face, at least for the major part of its length.

In addition to the terminal cutter bits **28** on each cutter support **27**, the outer face **37** of each support is provided with a series of outwardly extending cutter bits **40, 40,** along the leading edge of said surface. As shown in Figures 2 and 3, four such cutter bits are provided. Any suitable means may be provided for detachable mounting of the bits **40** in the form shown herein, said bits being fitted in sockets formed near the leading edge of the support, and held in place as usual by set screws **41,** introduced from the outer edge of said support.

The adjacent outer end surface **42** of the radial arm is preferably inclined at the same flared angle as the outer face **37** of the cutter bit support, as shown in Fig-

ure 2. One or more cutter bits **43**, similar to the bits **40**, may also be mounted along the leading side of said end surface **42**, as shown in detail in Figure 3.

It will now be understood that the form and arrangement of cutter bit support above described will permit the cutter head to be tilted in any direction while cutting, as for instance for following up and down seams, without objectionable binding of the cutter head in the bore. It may be explained in this connection, that resistance to deviation from forward boring progress of the head when the latter is working in a mine face is especially critical with respect to the outermost cutter supports **27**, since their outer faces are surrounded by solid coal, whereas the intermediate cutter supports **25** and **26** are only surrounded by relatively thin standing cores of material which can be readily broken. For this reason, the flared arrangement may usually be applied only to the outermost cutter supports, as hereinabove shown and described.

When the cutter head is tilted from its full-line position to dotted line position indicated in Figure 2, it will be observed that the outer end of the radial arm can cut its way into a new angular position, by means of cutter bits **28**, **40** and **43** on the outer face of support **27** and end face **42** of the arm. In particular, it will be noted that the outward flare of the support **27** is such that it will normally cut its way forward to leave a substantial clearance between its rear end and the bore, so that if the head is initially tilted to a relatively slight angle, the rear end does not immediately "heel" against the bore. Instead, the angular clearance is such as to permit the head to be tilted as the boring operation proceeds, with a minimum amount of cutting by the cutter bits on the under face of the cutter support until the new boring angle is established.

Although I have shown and described a preferred form of my invention, it should be understood that the disclosure is only illustrative and should not be understood to limit or confine my invention except by the appended claims.

I claim:

1. In a continuous mining machine for removing mineral from a solid seam, a mobile base, a cutting and dislodging head mounted on said base for up and down pivotal movement with respect thereto, said cutting and dislodging head including at least one boring arm assembly rotatable about a horizontal axis and having at least one radially extending arm carrying at the end thereof a forwardly extending bracket terminating in cutter bit means capable of cutting an annular kerf in a mine face when said boring arm assembly is rotated thereagainst, said bracket flaring outwardly and forwardly and having cutter bit means extending along at least the outer surface thereof whereby said boring arm assembly can be pivoted up or down while cutting to follow variations in level of the seam.

2. In a continuous mining machine for removing mineral from a solid seam, a mobile base, a cutting and dislodging head mounted on said base for up and down pivotal movement with respect thereto, said cutting and dislodging head including at least one boring arm assembly rotatable about a horizontal axis and having at least one radially extending arm carrying at the end thereof a forwardly extending bracket terminating in cutter bit means capable of cutting an annular kerf in a mine face when said boring arm assembly is rotated thereagainst, said bracket having a greater radial distance from the rotating axis at the forward end than at the rear end and having a plurality of radially extending cutter bits disposed along the outer face and toward the leading edge thereof, whereby said boring arm assembly can be pivoted up or down relative to said base while cutting to follow variations in level of the seam.

No references cited.