April 24, 1956 F. CARTLIDGE ET AL 2,743,094

COLLAPSIBLE BORING HEAD WITH COLLAPSIBLE PLOW

Filed Oct. 25, 1954 3 Sheets-Sheet 1

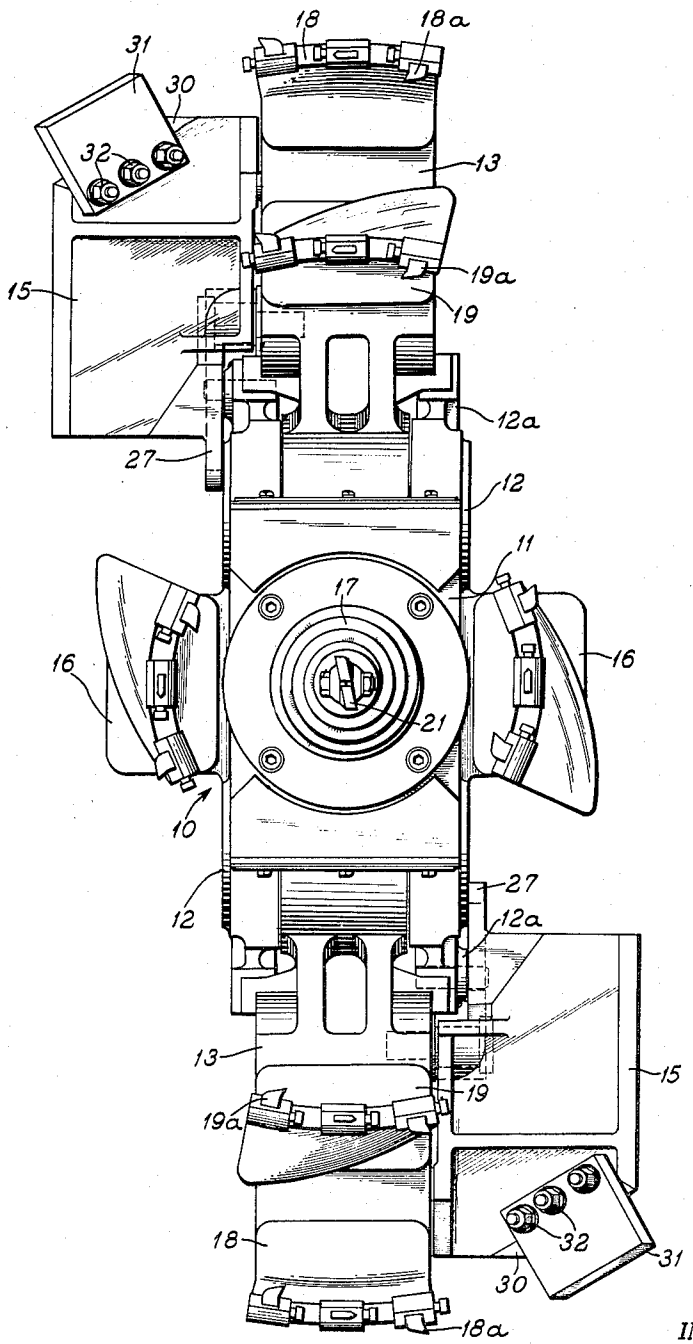


Fig 1

INVENTOR.
Frank Cartlidge
Herman E. Smith

BY
Murray A. Gleeson
ATTORNEY

April 24, 1956 F. CARTLIDGE ET AL 2,743,094

COLLAPSIBLE BORING HEAD WITH COLLAPSIBLE PLOW

Filed Oct. 25, 1954 3 Sheets-Sheet 2

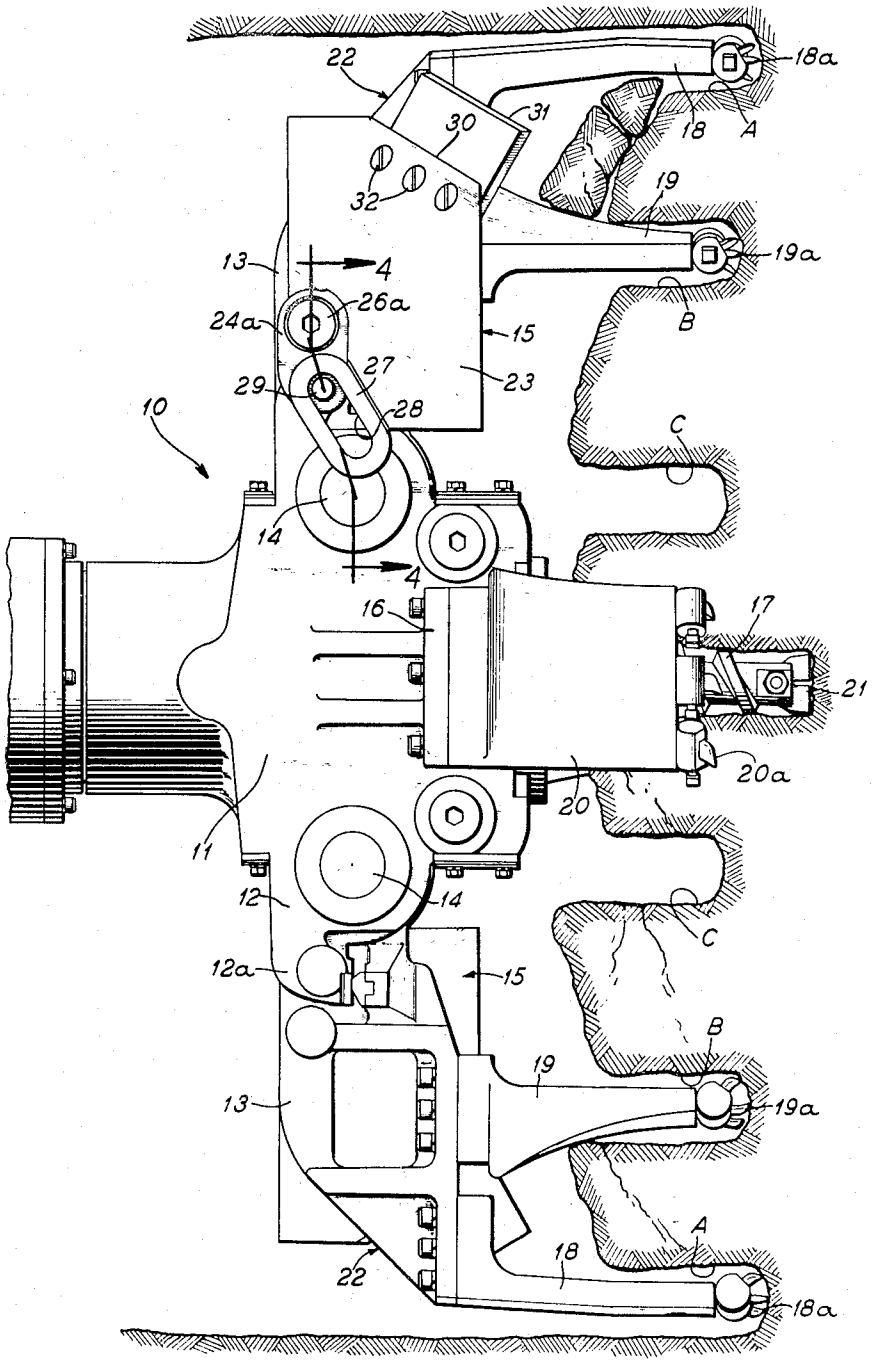


Fig. 2

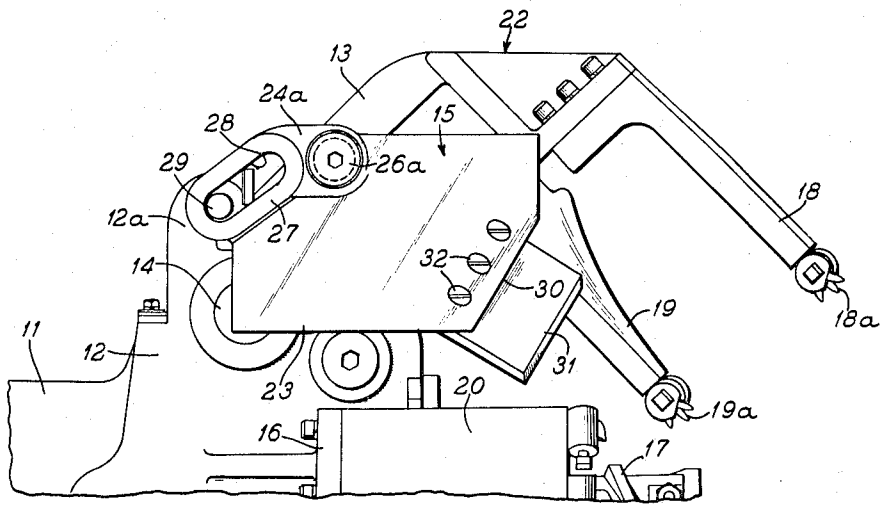
INVENTOR.
Frank Cartlidge
Herman E. Smith
BY
Murray A. Gleeson
ATTORNEY

April 24, 1956 F. CARTLIDGE ET AL 2,743,094

COLLAPSIBLE BORING HEAD WITH COLLAPSIBLE PLOW

Filed Oct. 25, 1954 3 Sheets-Sheet 3

Fig. 3



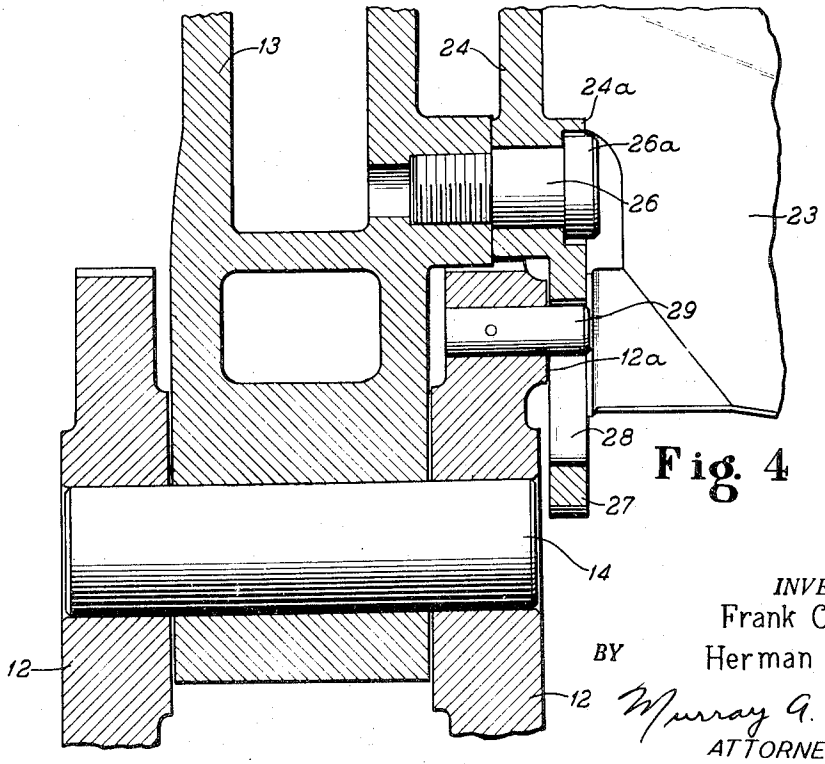


Fig. 4

INVENTOR.
Frank Cartlidge
Herman E. Smith
BY
Murray G. Gleeson
ATTORNEY

United States Patent Office 2,743,094 Patented Apr. 24, 1956

2,743,094

COLLAPSIBLE BORING HEAD WITH COLLAPSIBLE PLOW

Frank Cartlidge, Chicago, and Herman E. Smith, Park Forest, Ill., assignors to Goodman Manufacturing Company, Chicago, Ill., a corporation of Illinois

Application October 25, 1954, Serial No. 464,204

4 Claims. (Cl. 262—7)

This invention relates to improvements in boring heads for mining machines and more particularly to boring heads having a plurality of radially projecting cutter carrying arms arranged for hinged collapsing movement toward the axis of rotation of the boring head in order to reduce the diameter of the latter for facilitating the withdrawal of the head from a previously cut bore and also for facilitating tramming of the mining machine from place to place.

Boring heads of the kind used on mining machines are usually provided with plows or sweeps adjacent the outer ends of the radial arms, which extend toward the advancing sides of said arms to deflect or guide the material dislodged by the boring operation into position to be loaded onto a conveyor forming part of the machine.

The principal object of the present invention is to provide a hinged arm structure of the character above described, together with a plow or sweep arranged to swing forwardly through considerably greater range of hinged movement so as to afford greater compactness and lateral clearance for the arm structure when it is in its collapsed position.

Other objects of the invention will appear from time to time as the following description proceeds.

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

Figure 1 is a front view of a boring head constructed in accordance with my invention.

Figure 2 is a side view of the boring head of Figure 1, showing the head in normal fully extended cutting position in the working face of a mine.

Figure 3 is a fragmentary side view of one of the arms of the cutting head shown in Figure 1, with said arm and its plow or sweep in forwardly hinged fully collapsed position.

Figure 4 is an enlarged detail section taken on line 4—4 of Figure 2.

Referring now to details of the embodiment of the invention shown in the drawings, a cutter head indicated generally at **10** has as its main elements a hub **11** with hollow projections **12**, a pair of relatively long radially extending arms **13** hinged to said projections on pivot pins **14**. Each arm **13** has a plow **15** at one side thereof. The boring head also has a pair of shorter fixed arms **16** intermediate the longer arms and disposed at right angles thereto. A tapered burster cone **17** with a pilot bit **21** is fixed to the front end of the hub **11** concentrically thereof.

The longer hinged arms **13** each have two forwardly extending cutter supports **18**, **19** with bit clusters **18***a* and **19***a* thereon for cutting circular kerfs A and B in the working face. The shorter arms **16**, when used, have similar cutter supports **20** with bit clusters **20***a* for cutting a kerf C of smaller diameter.

The hub **11** encloses suitable mechanism for causing hinged adjustment of the pivoted arms **13**, which mechanism may be the same as disclosed in the copending

application of Frank Cartlidge bearing Serial No. 463,867 filed October 22, 1954 and which need not be more fully shown or described herein as it forms no essential part of the present invention.

Referring now to features of the hinged arms **13** and the plows **15**, which constitute an illustrative embodiment of the present invention, it will be seen in Figures 2 and 3 that rear faces **22** of the hinged arms at the outer ends thereof are bevelled at an angle of approximately 45° to the axis of rotation of the boring head when the arms are disposed in normal fully extended cutting position at right angles to said axis of rotation. The arrangement is such that when the arms are swung forwardly to their fully collapsed position shown in Figure 3, the bevelled faces **22** will then be substantially parallel to the axis of rotation of the boring head. This affords maximum radial clearance for the arms **13**.

Each of the plows **15** consists of a laterally and rearwardly angled plate **23** having a flanged base **24** which is pivotally mounted on the side face of the adjacent hinged arm **13** by a laterally extending pivot pin **26**. The latter pin may be threadedly engaged in said arm as shown and has an enlarged head **26***a* fitting in a boss **24***a* at the rear flanged edge of the plow near the inner corner of the latter. The plow also has an extension **27** at its inner rear corner with a downwardly and inwardly extending cam slot **28** formed therein. A pin **29** is fixed to the side wall **12***a* of the adjacent hub extension **12** and is slidably engaged in the guide slot **28**.

The outer end of the plate **23** is preferably cut away at a laterally and inwardly inclined angle to form a scraping edge **30** to which a semi-flexible extension **31** of rubber or rubber-like material is secured as by bolts **32**, **32**.

When the plows **15** are in their fully extended position they serve their usual function of engaging loose material within the bore in advance of their respective cutter arms **13**, and due to their rearwardly inclined position, aid in moving or deflecting the loose material rearwardly into position to be gathered upon and removed by a conveyor (not shown). It will be seen by comparison of Figures 2 and 3, however, that if the plows are fixed to the arms **13**, and the latter are moving forwardly to their collapsed position as in Figure 3, that the outer rear corner of each plow would project radially beyond the paths of the bevelled faces **22** of the arms, and increase the working diameter of the boring head correspondingly. Since the plows **15** are offset laterally from their respective arms, the increase in working diameter of the boring head due to the plows **15** would be considerably greater than that appearing from viewing Figure 2.

However, by reason of the novel form of hinged connection of the plows **15** to the sides of their respective arms, and the slotted engagement of the cam slots **28** at the base of said plows by pins **29** on the hub, as shown, the plows will be automatically swung forwardly with, but at progressively greater angles than said arms, so as to assume a substantially greater angle to their normal radial position than their arms when the arms are in their fully collapsed forward positions. For instance, in the illustrative embodiment shown, each plow will be swung through an angle of approximately 90° so that their rear edges are substantially parallel with the axis of rotation of the boring head, while their respective arms will be swung forwardly only about one-half as much, that is to say, at an approximate angle of 45° to the axis of rotation of the boring head. In this way, the plows are withdrawn inwardly so as to be entirely within the radii of their respective arms when

the arms are swung forwardly to their fully collapsed positions shown in Figure 3. Similarly, when the arms are swung outwardly to their normal boring position, the plows will be swung faster than the arms, so as to resume their normal scraping and deflecting positions shown in Figures 1 and 2.

Although I have shown and described certain embodiments of my invention, it will be understood that I do not wish to be limited to the exact construction shown and described, but that various changes and modifications may be made without departing from the spirit and scope of my invention as defined in the appended claims.

I claim:

1. In a boring head for mining machines having a rotary hub, a plurality of cutter carrying arms having outer end portions hinged on said hub for forward collapsing movement relative to the axis of rotation of said hub to reduce the diameter of said boring head, each of said arms having a rearwardly and laterally inclined plow extending along one side thereof, hinged to said arm for forward collapsing movement relative to said arm, and cam means coacting between each plow and a portion fixed to said hub, for causing said plow to swing

forwardly and rearwardly at progressively greater angles than the arm on which said plow is hinged, so as to retract said plow within the radius of its arm when the latter is in forwardly collapsed position.

2. The structure in accordance with claim 1, wherein the arms have bevelled faces at their rear outer corners, and the rear outer corners of their respective plows normally project beyond the paths of rotation of said bevelled faces when the arms are in their fully extended boring positions, but are retracted within the paths of rotation of said arms when the latter are in forwardly collapsed positions.

3. The structure in accordance with claim 1, wherein each plow is hinged to its arm adjacent the inner rear corner of the plow.

4. The structure in accordance with claim 2, wherein the cam means comprises a forwardly and inwardly inclined guide disposed at the inner rear corner of the plow, and a pin in fixed relation to the hub and slidably movable along the guide on the hinged plow.

No references cited.