July 1, 1958 M. G. THASSY 2,841,380

CONTINUOUS MINING MACHINE WITH ADJUSTABLE BORING HEAD

Filed July 26, 1957 2 Sheets-Sheet 1

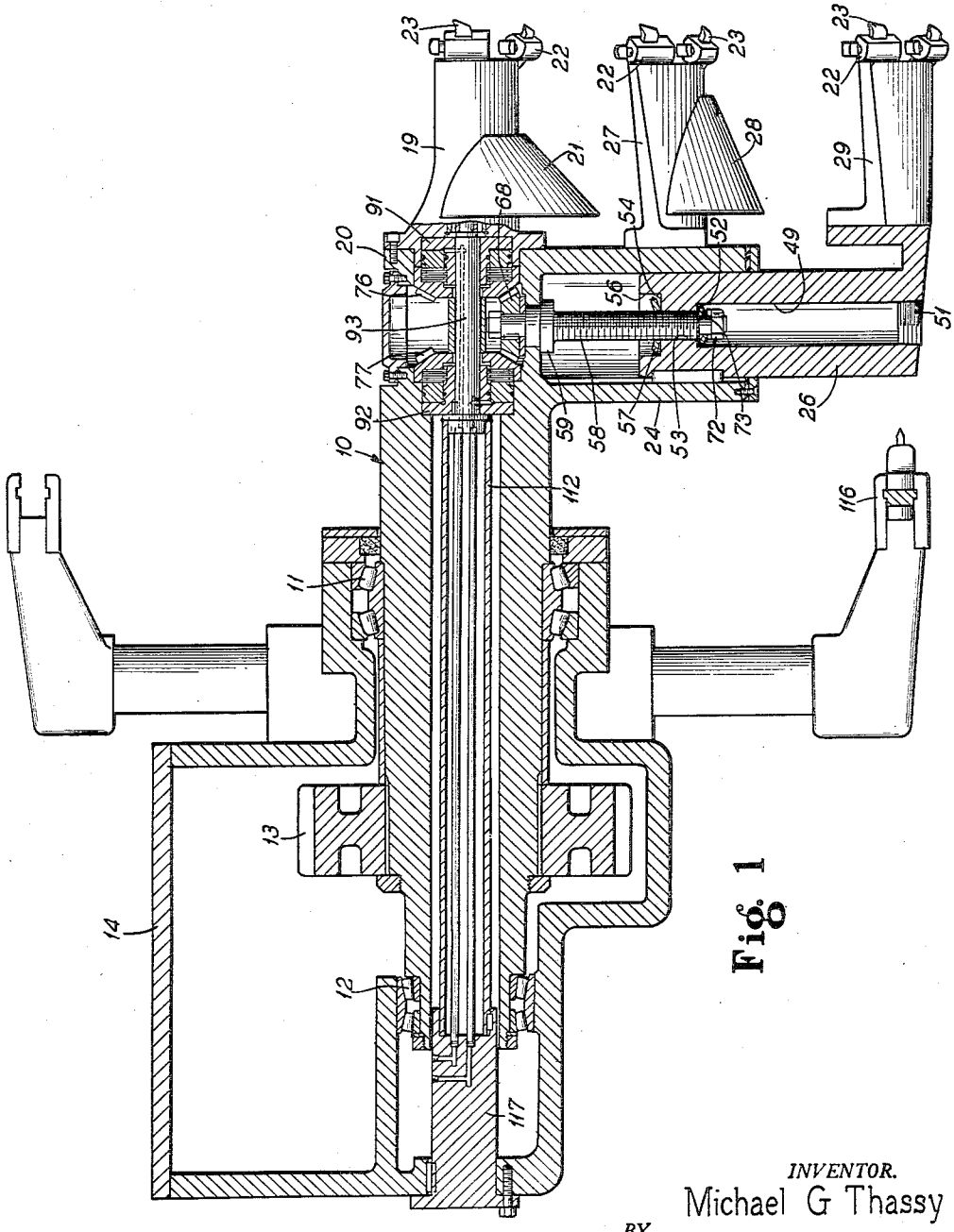


Fig. 1

INVENTOR.
Michael G Thassy

BY
Murray A. Gleason

ATTORNEY

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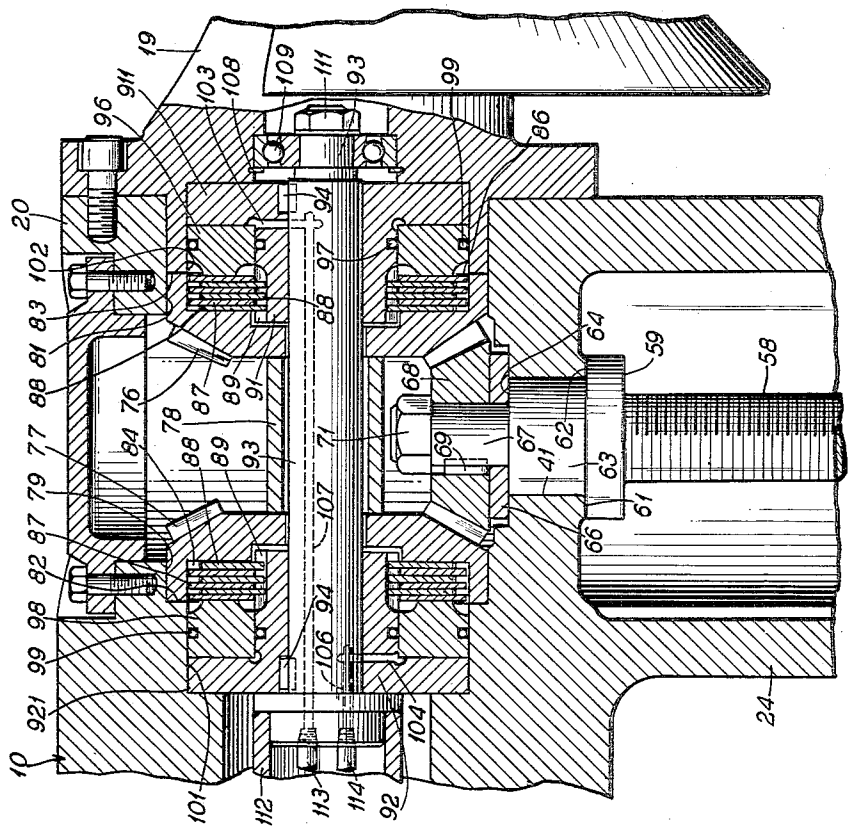


Fig. 2

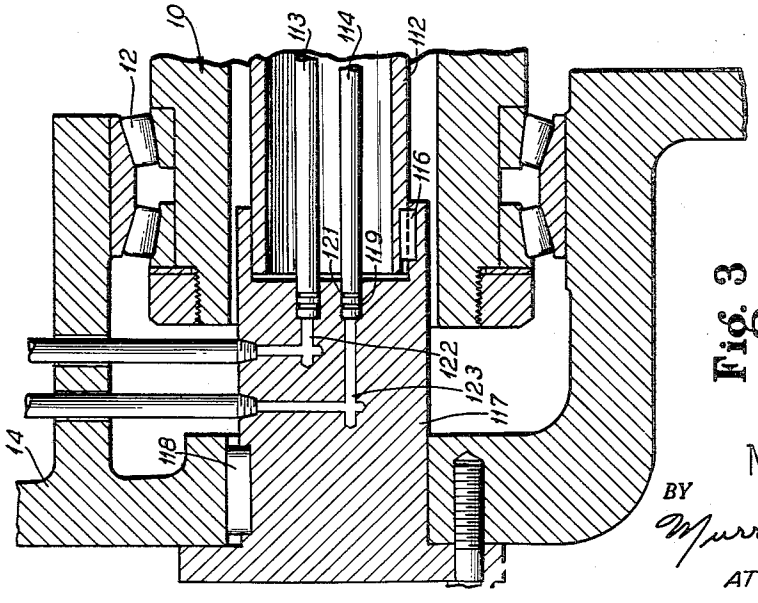


Fig. 3

INVENTOR.
Michael G. Thassy
BY
Murray A. Gleeson
ATTORNEY

United States Patent Office

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CONTINUOUS MINING MACHINE WITH ADJUSTABLE BORING HEAD

Michael G. Thassy, Chicago, Ill., assignor to Goodman Manufacturing Company, Chicago, Ill., a corporation of Illinois

Application July 26, 1957, Serial No. 674,448

3 Claims. (Cl. 262—26)

This invention relates to improvements in boring heads for mining machines in which at least one boring head is rotatable on a horizontal axis in advance of the machine. More particularly, the invention relates to the type of telescopic adjustment for the outer end of a boring head arm, such as shown in my application, Serial No. 621,678, filed November 13, 1956, now Patent No. 2,798,708.

The principal object of the present invention is to provide a simple form and arrangement of means for adjusting the telescopic end portion of a boring head arm relative to its hub.

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

Figure 1 is a longitudinal section of a boring head and arm constructed in accordance with the invention;

Figure 2 is a detail section of the hub portion of the head drawn to a larger scale than Figure 1; and

Figure 3 is a detail section showing the rear end of the drive shaft and associated parts drawn to a larger scale than Figure 1.

Referring now to details of the embodiment of the invention shown in the drawings, **10** indicates the drive shaft of a boring head mounted for rotation in bearings **11** and **12**, and driven by gear **13**. The bearings **11** and **12** are mounted in the gear case **14** which is a portion of an auxiliary frame forming part of a mining machine. Trimming chain guide **116** is telescopically mounted on the auxiliary frame and forms part of the usual equipment found on mining machines of the type to which the present invention is directed.

The boring head **10** has a hollow hub **20** at its front end on which is fixed a center drill base **19**, which has a wedging surface **21**, bit holders **22** and cutter bits **23** at its front end. A radial arm **24** extends from the hub **20** and has a telescopically extensible arm **26** mounted therein. The radial arms **24** may have a forwardly projecting cutter support **27** fixed thereon with a wedging surface **28** and bit holders **22** and bits **23**. The telescopic arm **26** has a forwardly extending cutter support **29** mounted on its outer extremity with bit holders **22** and bits **23** mounted thereon.

The telescopic arm **26** has an axial bore **49** sealed at its outer end by plug **51**. The inner end of the bore terminates in a shoulder **52** and a threaded bore **53**. The threaded bore **53** terminates in a counter bore **56** having a shoulder **54**. An extension screw having threads **58** engages the threaded bore **53**. The end of said screw is secured in the bore **49** by a nut **72** and a concave washer **73**, commonly called a coned spring. A second coned spring **57** in the opposite counter bore **56** is mounted to slip freely over the threads **58** of the screw and may from time to time act as a resilient spacer between shoulder **54** of the telescopic arm and a shoulder **59** at the opposite end of the screw. Opposite shoulder **62** on screw **58** bears against the pad **61** in the hub of boring head **10**. An annular portion **63** of the screw is rotatably fitted in bore **41** of head **10**. A flat thrust

washer **66** is held against an inner shoulder **64** of annular portion **63** by a bevel gear **68** fixed to a reduced end portion **67** of the screw as by key **69** and nut **71**. The parts of the telescopic boring arm are similar to those disclosed in my prior application, Serial No. 621,678, filed November 13, 1956.

Referring now to details of the control means forming the subject matter of the present invention, the gear **68** and its associated parts are shown in greater detail. Gear **68** is intermeshed with gears **76** and **77** which are spaced apart by a tubular spacer **78**. Gear **77** is rotatably journaled in bore **79** of head **10** and gear **76** is rotatably journaled in bore **81**, both of which bores are concentric with the axis of head **10**. The gear **77** abuts a shoulder **82** in head **10** and gear **76** abuts a shoulder **83** on center drill **19** so as to locate the axial positions of the gears **76** and **77**. The outer faces of both gears **76** and **77** are recessed to form clutch housings, and internal splines **84** and **86** are formed in the gears **77** and **76** which are engaged by alternate discs **87** of a stack of friction disc members. The other friction discs **88** engage splines **89** of flanged sleeves **91** and **92**, which are fixed to a shaft **93** as by keys **94**.

Annular pistons **96** and **98** are slidable on sleeves **91** and **92** between the end flanges **911** and **921** of said sleeves and the friction discs in the housings of gears **76** and **77** respectively. The outer surfaces of the annular pistons **96** and **98** and the outer surfaces of sleeves **91** and **92** are grooved to receive O rings **97** and **99** respectively, to provide fluid tight seals for the pistons.

Flanged sleeves **91** and **92** have fluid ports **103**, **104** which register with passages **106** and **107** in shaft **93** to provide a passage for pressure fluid to the pistons **96** and **98**. The front end of shaft **93** is axially secured but rotatably mounted in the center drill base by means of snap ring **108**, bearing **109**, and lock nut **111**. The rear end of shaft **93** terminates adjacent flanged sleeve **92**, and has a tubular member **112** secured to it as by welding. The end of the shaft is tapped to secure conduits **113** and **114** which communicate with passages **107** and **106**.

Referring now to Figure 3, the tubular member **112** is fixed as by key **116** to a supporting member **117** which is itself fixed to the gear case **14** as by key **118**. Thus the shaft **93** and flanged sleeves **91** and **92** are kept from rotating relative to the gear case **14**, while the head **10** is free to rotate.

The ends of conduit **113** and **114** are grooved to accept O rings **119** and **121** which when slipped into bores in the support **117** form a fluid tight seal. Passages **122** and **123** in support **117** communicate with the conduits **113** and **114**, and connect on their other end to conventional pressure control means, not shown.

In operation, the drive shaft **10**, hub **20** and arm **24** are rotated as usual by the gear **13**, but the parts on which the gears **76** and **77** are rotatably supported within the hub **20** are fixed against rotation by the supporting member **117** which is keyed to the gear case **14** at the rear end of the drive shaft **10**, and is connected through a tube **112** passing forwardly through said drive shaft to the shaft **93** and flanged sleeves **91** and **92** within the hollow hub **20**.

In normal operation, the two gears **76** and **77** both remain in meshed relation with the gear **68** fixed on the screw **58**, but no driving effect is imparted to said screw during rotation of the boring head while the clutch plates associated with the two gears **76** and **77** are disengaged.

When it is desired to extend or retract the telescopic arm **26**, fluid pressure is admitted to one or the other conduits **113** or **114** so as to engage the clutch plates associated with one or the other gears **76** or **77**.

For instance, the engagement of the clutch plates associated with gear **76** will arrest the rotation of the latter gear, whereupon continued rotation of the head as a whole will cause the screw **58** to be rotated in a direction to extend or retract the telescopic arm **26**, depending upon whether said screw has a right or left hand thread. When fluid pressure is released from the position associated with gear **76**, the latter gear will again be free for rotation relative to the shaft **93**, whereupon any further driving effect on the screw **58** will be discontinued.

Conversely, when it is desired to adjust the telescopic arm **26** in the opposite direction, fluid pressure is admitted through the pipe **114** to impose pressure through annular piston **98** upon the clutch plates associated with the gear **77** to arrest rotation of the latter and cause the screw **58** to rotate in the opposite direction.

When the telescopic arm **26** is either extended or retracted to its limit of movement in either direction, as determined by engagement with either the coned spring **57** or **73**, further rotation of the screw **58** will be discontinued due to slippage afforded between the clutch plates associated with gear **76** or **77**, thus protecting the parts against damage.

Although I have shown and described certain embodiments of my invention, it will be understood that various changes and modifications may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. In a boring machine, a frame, a rotary boring head comprising a hollow drive shaft, a hollow hub, a hollow inner arm portion extending radially from said hub and separated from said hollow hub by a transverse partition, a cutter-carrying end portion telescopically mounted in the outer end of said inner radial arm portion, an extension screw extending radially of said inner arm portion, with its outer end in threaded engagement with said telescopic outer end portion and its inner end extending through and having bearing engagement in said transverse partition, a gear fixed on the inner end of said extension screw within said hollow hub, an anchoring member having its inner end fixed to said frame and extending forwardly through said hollow drive shaft and into said hollow hub, a pair of opposed gears adapted normally for free rotation in said hollow hub and each meshed with opposite sides of the gear on said extension screw, and clutch means associated with each of said gears for selectively connecting them to the anchoring member in said hub to restrain free rotation thereof, thereby causing rotation of said extension screw in one direction or the other, due to rotation of said hub.

2. The structure of claim 1, wherein the clutch means associated with each of the opposed gears in the hub is actuated by fluid pressure means including separate prssure supply ducts extending along the anchoring member from beyond the rear end of the drive shaft.

3. The structure of claim 2, wherein the fluid pressure means for selectively actuating the clutch means associated with the two opposed gears each includes a plurality of clutch plates alternately connected with its respective gear and the anchoring member, and an annular piston responsive to fluid pressure for engaging said clutch plates.

References Cited in the file of this patent

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