Nov. 29, 1966 J. GONSKI 3,288,534

CONTINUOUS MINER HAVING RELATIVELY ADJUSTABLE TRANSMISSION HOUSINGS FOR BORING SHAFTS

Filed April 22, 1964 6 Sheets-Sheet 1

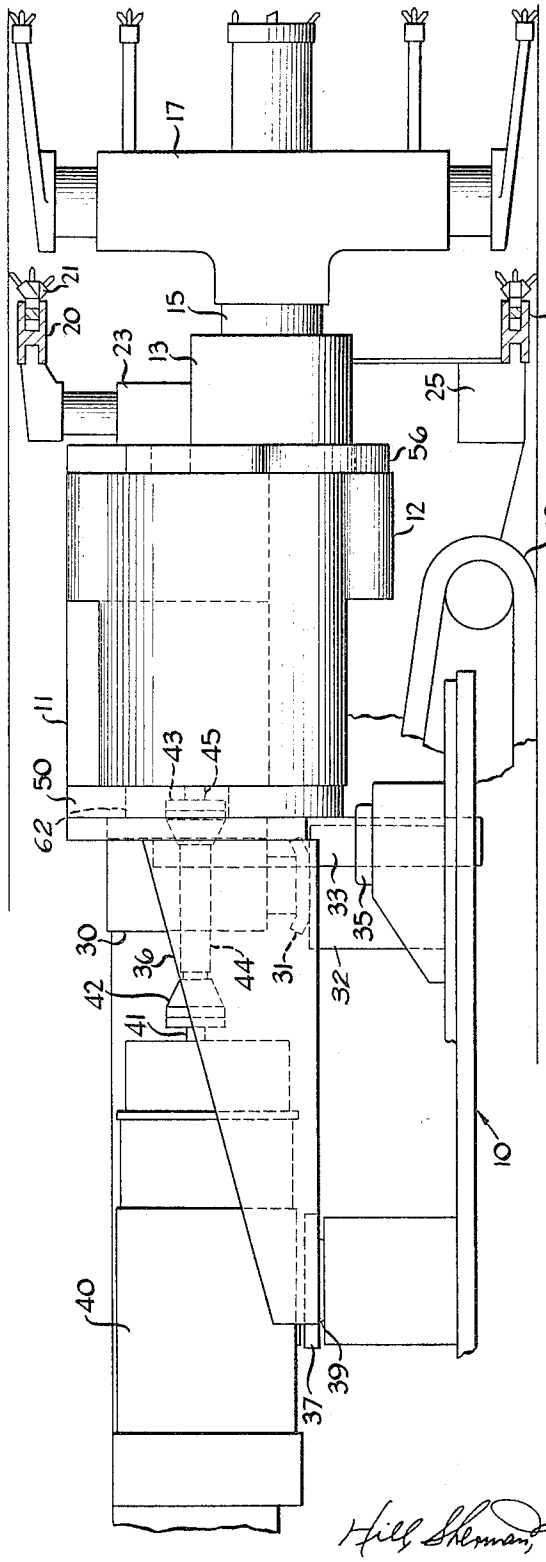


Fig 1

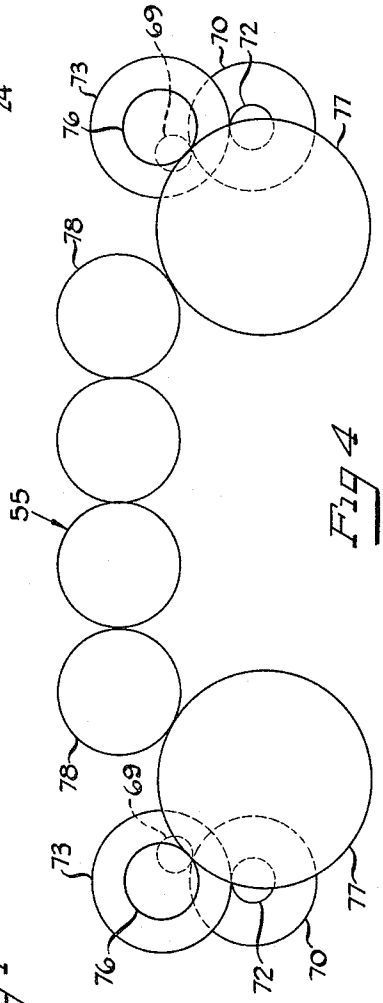


Fig 4

INVENTOR.
Joseph Gonski

BY

Hill Sherman, Meroni, Gross & Simpson ATTORNEYS

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CONTINUOUS MINER HAVING RELATIVELY ADJUSTABLE TRANSMISSION HOUSINGS FOR BORING SHAFTS

Filed April 22, 1964 6 Sheets-Sheet 2

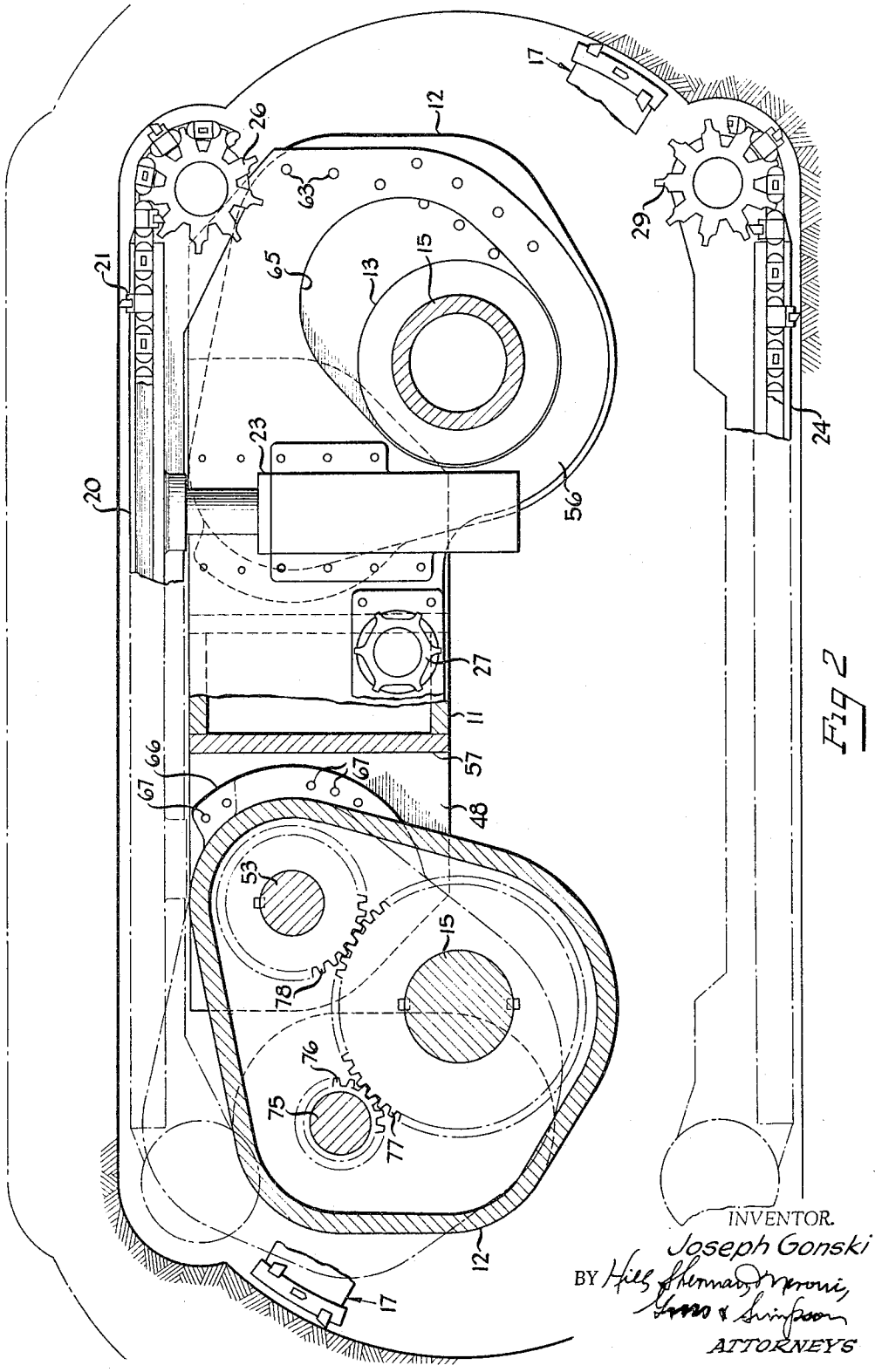


Fig 2

INVENTOR.
Joseph Gonski
BY Hill, Sherman, Meroni, Gross & Simpson
ATTORNEYS

Nov. 29, 1966 J. GONSKI 3,288,534

CONTINUOUS MINER HAVING RELATIVELY ADJUSTABLE TRANSMISSION HOUSINGS FOR BORING SHAFTS

Filed April 22, 1964 6 Sheets-Sheet 3

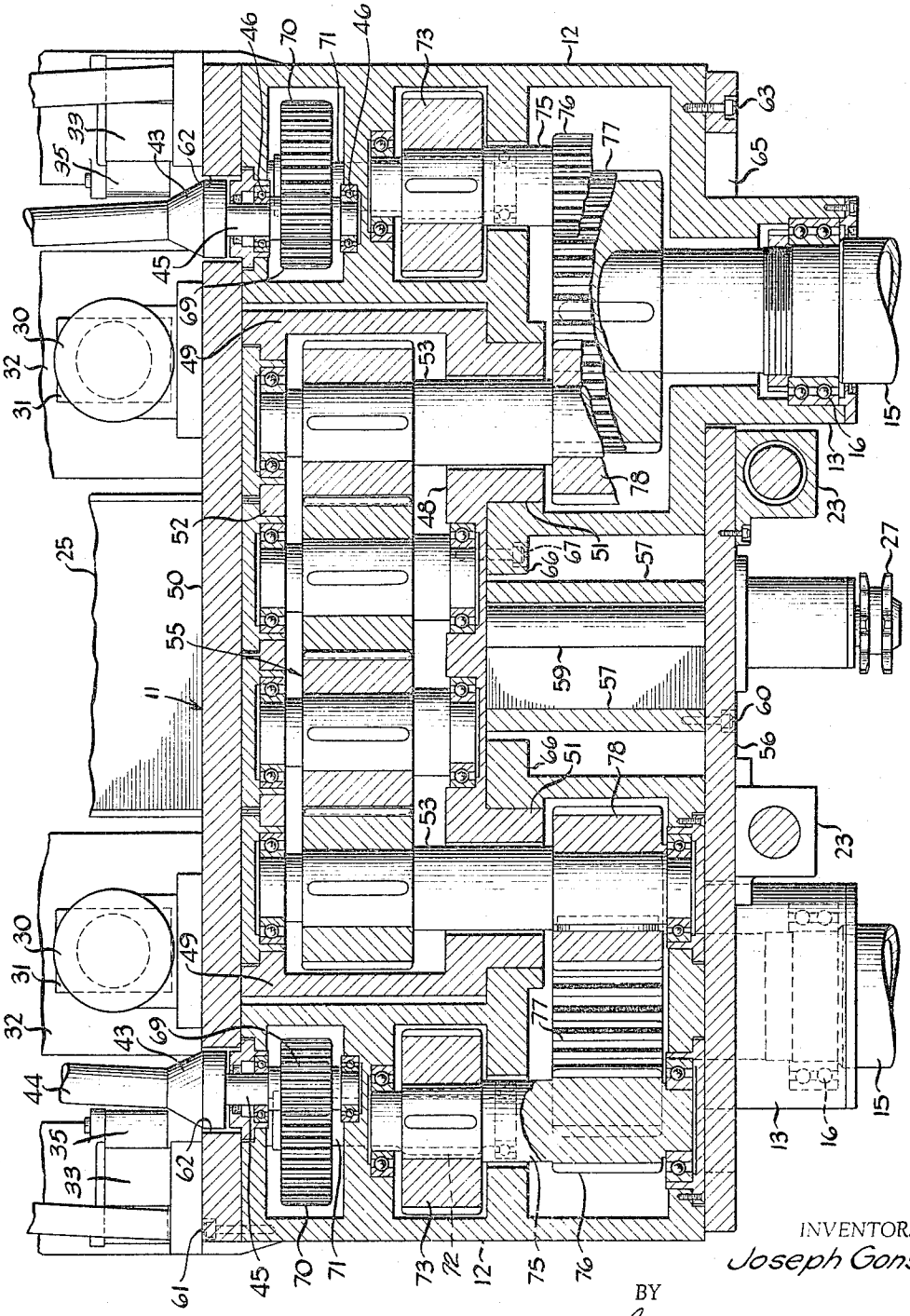


Fig 3

INVENTOR.
Joseph Gonski

BY

Hill, Sherman, Meroni, Gross & Simpson ATTORNEYS

Nov. 29, 1966 J. GONSKI 3,288,534

CONTINUOUS MINER HAVING RELATIVELY ADJUSTABLE TRANSMISSION HOUSINGS FOR BORING SHAFTS

Filed April 22, 1964 6 Sheets-Sheet 4

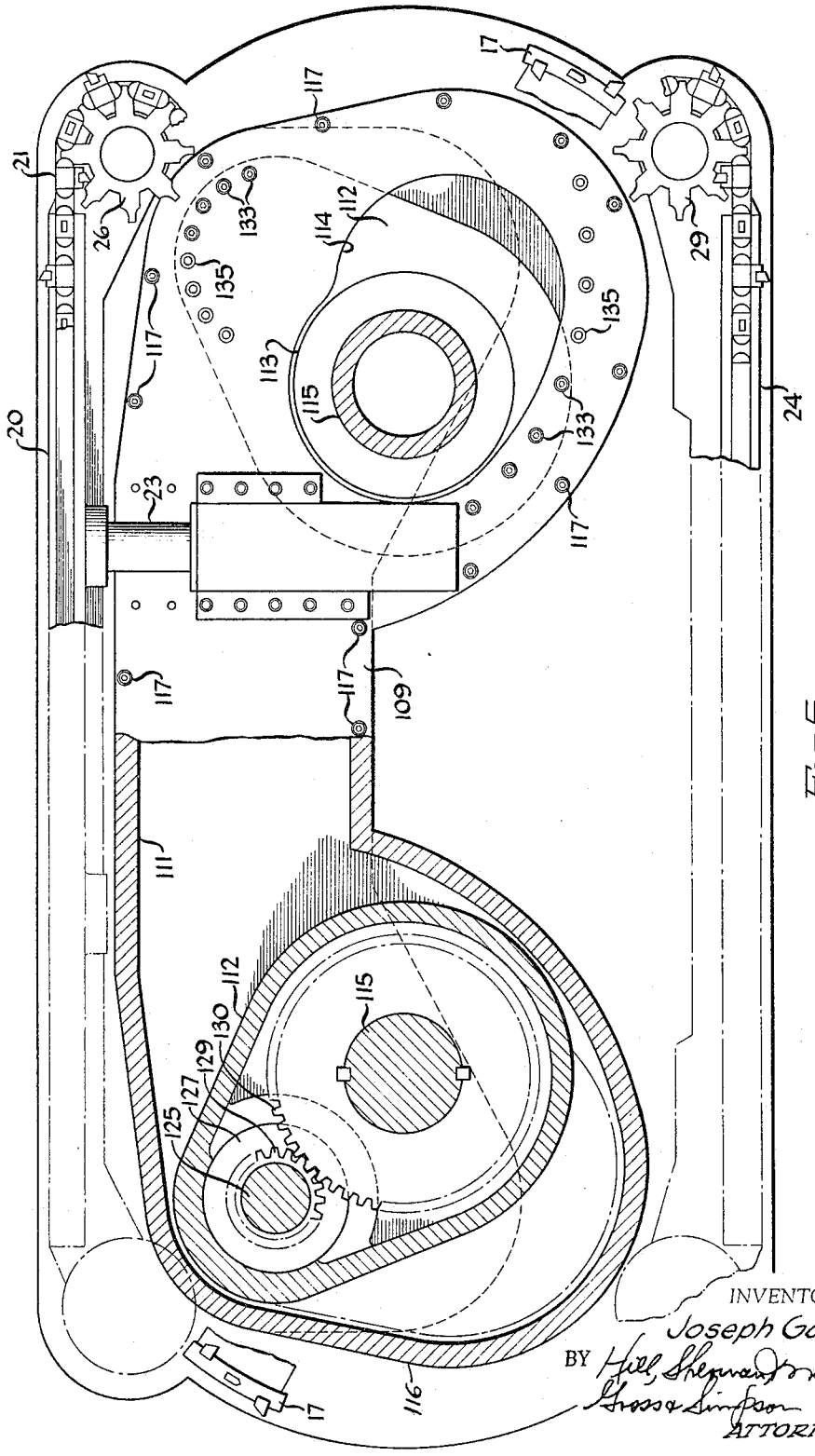


Fig 5

INVENTOR.
Joseph Gonski
BY Hull, Sheppard & Moroni, Gross & Simpson
ATTORNEYS

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CONTINUOUS MINER HAVING RELATIVELY ADJUSTABLE TRANSMISSION HOUSINGS FOR BORING SHAFTS

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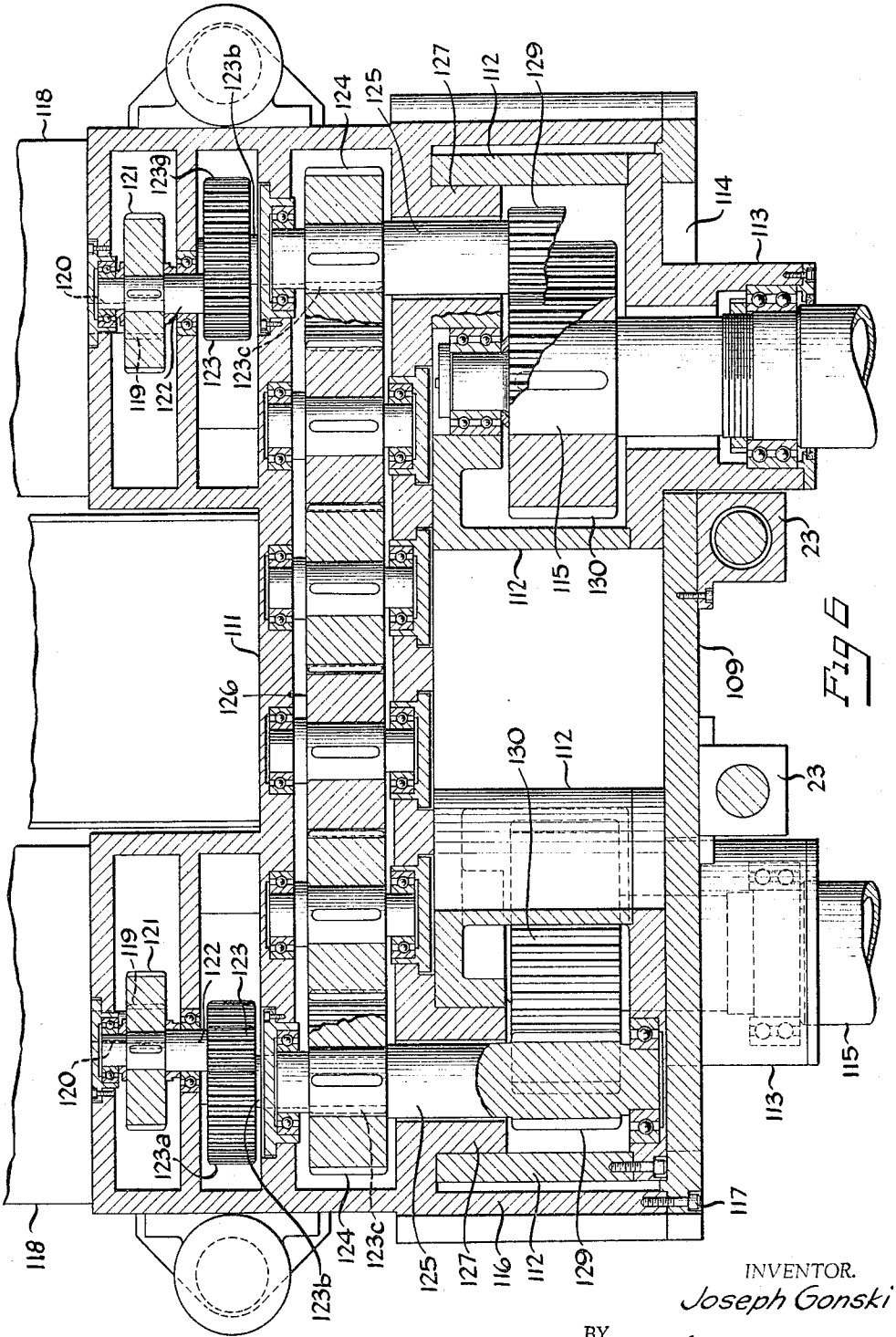


Fig 6

INVENTOR.
Joseph Gonski

BY

Hill, Sherman, Meroni, Gross & Simpson

ATTORNEYS

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TRANSMISSION HOUSINGS FOR BORING SHAFTS
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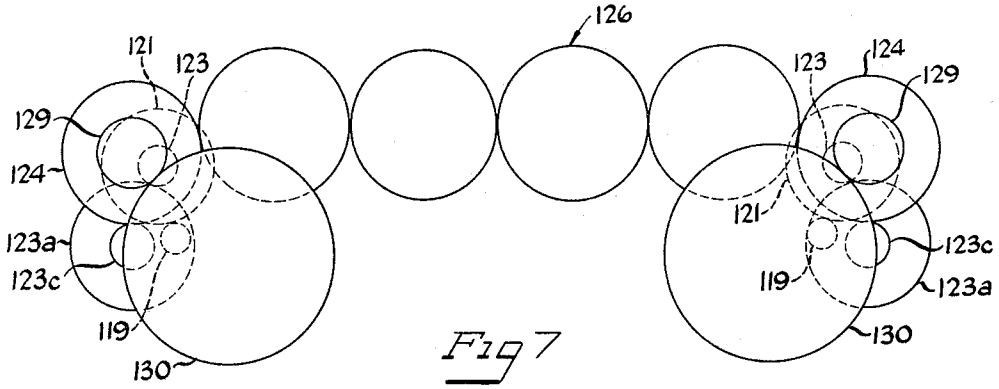


Fig 7

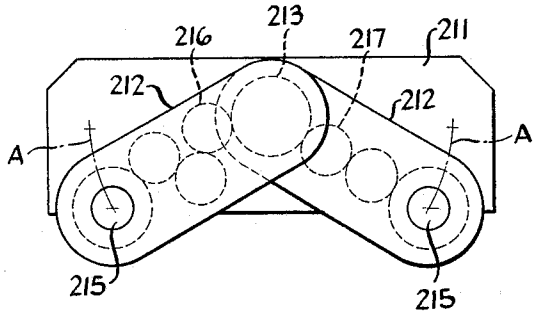


Fig 8

INVENTOR.
Joseph Gonski
BY
Hill, Sherman, Meroni, Gross & Simpson ATTORNEYS

United States Patent Office 3,288,534 Patented Nov. 29, 1966

3,288,534

CONTINUOUS MINER HAVING RELATIVELY ADJUSTABLE TRANSMISSION HOUSINGS FOR BORING SHAFTS

Joseph Gonski, Chicago, Ill., assignor, by mesne assignments, to Westinghouse Air Brake Company, Pittsburgh, Pa., a corporation of Pennsylvania

Filed Apr. 22, 1964, Ser. No. 361,685
13 Claims. (Cl. 299—59)

This invention relates to improvements in continuous mining machines of the boring type and more particularly relates to such machines adjustable for mining working places of various widths.

A principal object of the present invention is to provide an improved form of support and drive means for the boring heads of a multiple boring head type of continuous mining machines so arranged as to be adjustable to vary the spacing between the drive shafts of the boring heads and to accommodate the boring heads to mine working places of various widths.

Another object of the present invention is to provide an improved form of continuous mining machine having a plurality of forwardly extending boring heads mounted on power driven shafts, in which the shafts and boring heads are carried by laterally adjustably movable housings, spacing the boring heads in various selected spaced relation with respect to each other without interfering with the drive to the boring heads.

Another object of the invention is to provide a variable cutting width continuous mining machine having at least two spaced boring heads in which the boring heads are carried in auxiliary housings movably mounted on the main supporting housing for the machine, for adjustable movement toward and from the longitudinal center of the machine, and in which the housings are positively secured in their adjusted positions during a boring operation.

A further object of the invention is to provide a novel and improved form of variable spacing multiple boring head type of continuous mining machine, in which the boring heads are carried on auxiliary housings pivotally mounted on the main supporting housing of the machine, for movement about axes extending longitudinally of the machine and on opposite sides of the longitudinal axis thereof, and in which the shafts supporting and driving the boring heads are eccentric of the axes of pivotal movement of the auxiliary housings, to effect adjustable movement of the boring heads and boring head shafts toward and from the longitudinal center line of the machine, by pivotal movement of the housing about their pivotal axes.

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 view in side elevation of the forward end portion of a continuous mining machine constructed in accordance with the principles of the present invention, with certain parts broken away and certain other parts shown in longitudinal section;

FIGURE 2 is a fragmentary view looking at the front end portion of the machine shown in FIGURE 1, with the boring heads removed and certain parts broken away and certain other parts shown in transverse section;

FIGURE 3 is a fragmentary horizontal sectional view taken through the main and auxiliary supporting housings for the machine and showing the gear trains for driving the boring heads, and the mountings for the auxiliary housings on the main housing;

FIGURE 4 is a diagrammatic view schematically illustrating the gear trains for driving the boring heads;

FIGURE 5 is a fragmentary front end view of a continuous mining machine, similar to that shown in FIGURE 1, with certain parts broken away and certain other parts shown in transverse section, and illustrating a modified form in which the invention may be embodied;

FIGURE 6 is a fragmentary horizontal sectional view taken through the main supporting housing and the auxiliary supporting housings of a machine constructed in accordance with the modified form of the invention shown in FIGURE 5;

FIGURE 7 is a diagrammatic view schematically showing the gear train of the form of the invention illustrated in FIGURES 5 and 6; and

FIGURE 8 is a diagrammatic front end view of the main housing and adjustable auxiliary supporting housings for the boring heads of a continuous mining machine, showing still another form in which the invention may be embodied.

In the embodiment of the invention illustrated in FIGURES 1 through 4 of the drawings, I have shown in FIGURE 1 a continuous mining machine of the boring type having a mobile base or main frame **10** and having a cutter frame structure or main supporting housing **11** supported upon and extending in advance of the main frame.

The main supporting housing **11** has auxiliary supporting housings **12** mounted thereon on the outer sides of the center line of the machine for pivotal adjustable movement toward and from the longitudinal center of the machine. Each auxiliary supporting housing has a hub **13** extending forwardly therefrom and forming a bearing support for a boring shaft **15**, on ball bearings **16**. Each boring shaft **15** has a boring head **17** mounted thereon and rotatably driven thereby.

The boring heads **17** may be of a conventional form, radially adjustable to vary the cutting diameters of the boring heads, and no part of the present invention, so not herein shown or described further.

The main frame **10** is supported on the usual laterally spaced continuous traction thread devices **19**, which serve to tram the machine from working place to working place and to feed the boring heads **17** into the mine face. The continuous traction tread devices **19** may be of a conventional form, driven from individual motors and speed reducers (not shown), so not herein shown or described further.

The main supporting housing **11** also forms a support for an upper trimmer or cutter bar **20** extending across the forward end thereof in rearwardly spaced relation with respect to the boring heads **17**, and having a trimmer chain **21** guided for movement therealong, for cutting out the cusps, depending from the mine roof between the boring heads. The trimmer bar **20** is mounted on the usual hydraulic jacks **23**, mounted on the forward end of the main supporting housing **11** and extending vertically of said main supporting housing and positioning the upper trimmer bar **20** behind the boring heads **17** and forwardly of the main supporting housing **11**.

A lower trimmer bar **24** extends across the forward end portion of a frame structure **25** for the receiving end portion of the conveyor of the machine (not shown) and is suitably supported thereon. The conveyor may be of a conventional form and may extend along the main frame **10** from a position adjacent the ground in advance of the forward end of said main frame, along and beyond the rear end thereof.

The conveyor frame structure may be raised by suitable hydraulic jacks (not shown) to clear the ground and also raises the lower trimmer bar **24** when the conveyor is raised, when it is desired to tram the machine from working place to working place.

The trimmer chain **21** is trained about corner sprockets **26** at opposite ends of the upper trimmer bar **20** and downwardly and inwardly therefrom, one run of said chain being trained about a drive sprocket **27** and the other run of said chain being trained about an idler sprocket (not shown) in a conventional manner. From thence the chain is trained outwardly about corner sprockets **29, 29** at opposite ends of the lower trimmer bar **24**.

The main supporting housing **11** is supported adjacent the forward end of the main frame **10** on a pair of laterally spaced independently operable hydraulic jacks **30, 30**. The hydraulic jacks **30, 30** may be of a conventional form and are mounted on a rear wall of the main supporting housing **11** and extend vertically therealong and are shown in FIGURE 1 as having shoes **31, 31** engaging the top surfaces of support blocks **32, 32**, for limited angular movement with respect thereto.

The side thrusts of mining are taken by a pair of laterally spaced vertically extending thrust bars **33, 33**, mounted on the rear end of the main supporting housing and depending therefrom. The thrust bars **33, 33** extend along the insides of side thrust shoes **35, 35** and limit lateral movement of the housing **11** and thereby take the side thrusts of mining on said housing. The main supporting housing **11** also has parallel spaced arms **36, 36** extending rearwardly therefrom and connected together at their rear ends by a connector plate **37**. The plate **37** is mounted on a universal thrust transmitting joint **39** at the longitudinal center of the machine, beneath the conveyor of the machine, which takes the thrusts of mining along the longitudinal center of the mining machine. The universal joint **39** and thrust transmitting structure between the arms **36** and said universal joint may be of a form similar to that shown and described in the Newton et al. application Serial No. 154,961 filed November 27, 1961, and entitled, "Continuous Mining Machine," and now Patent No. 3,208,797 dated November 27, 1965.

Each arm **36** forms a support for a motor **40**, extending along the inside thereof and rearwardly beyond the rear end thereof. Each motor **40** has a motor shaft **41** having a universal joint **42** on the end thereof and driven therefrom and driving a spaced universal joint **43** through an extensible shaft **44**. The universal joints **42** and **43** may be of any well known form and serve to drive a drive shaft **45**, journalled in the auxiliary housing **12** on spaced bearings **46**, in the various positions of said auxiliary housing with respect to the motor **40**.

The two auxiliary housings **12** are of a similar construction and the drive gearing journaled therein and driving the boring heads **17**, is the same for each boring head so one only need herein be shown or described in detail.

The main supporting housing **11** has a transversely extending front wall **48** having parallel rearwardly extending side walls **49**, extending rearwardly from its opposite ends, to a back wall **52** forming supports for the bearings for the gearing journaled within said housing. The back wall **52** is abutted by a closure plate **50** for said main supporting housing. The plate **50** extends beyond opposite sides of the back wall **52** and has vertically extending arcuate slots **62** therein to receive the universal joints **43** and shafts **45** driven thereby.

The front wall **48** has spaced hollow bosses **51** extending forwardly therefrom, each of which hollow bosses forms a pivotal mounting for an auxiliary housing **12**, and has a connecting shaft **53** extending therethrough, coaxial with the axis of adjustable movement of the associated auxiliary housing. The connecting shafts **53** serve to connect the drive gearing for driving the two boring heads together, through a gear train **55**.

The auxiliary housings **12** are abutted at their forward ends by a front plate **56** extending across the front of the main supporting housing **11** and auxiliary housing **12** and spaced from and secured to the main supporting housing **11** as by parallel spacer walls **57** extending forwardly of the front wall **48** along opposite sides of a drive shaft **59**

for the sprocket **27** and suitably driven by the gear train **55**. Cap screws **60** are shown as being provided to secure the front plate **56** to the spacer plates **57**, and to the main supporting housing **12**.

The back plate **50** is suitably secured to the main supporting housing **11** and serves to retain the auxiliary housings **12** in position when in the proper position of adjustment to retain their boring heads in position to mine at a selected width. As shown in FIGURE 3, machine screws **61** are provided to retain the auxiliary housings to said closure plate when in the proper adjusted relation with respect to the main supporting housing **11**.

The front plate **56** is secured to the main supporting housing **11** by the machine screws **60** and is secured to the auxiliary supporting housings **12** when in a selected position, by machine screws **63**, it being understood that threaded holes are provided in the auxiliary supporting housings **12** to correspond to the various cutting widths of the machine. The front plate **56** has arcuate slots **65** therein for receiving the hubs **13** of the auxiliary housings **12**, and accommodating adjustable movement of the boring heads **11** about the axes of the connecting shafts **53**.

The auxiliary housings **12** have flanged portions **66** extending radially of the hubs **51** along the outside of the wall **48**, which may be secured to said wall, as by machine screws **67**. The machine screws **67** are registrable with threaded drilled holes in the wall **48** corresponding to the various positions of lateral adjustment of the boring heads with respect to the longitudinal center of the machine.

The drive connection from each universal coupling **43** and shaft **45**, driven therefrom, includes a spur gear **69** on the end of the shaft **45**, meshing with and driving a spur gear **70** on the rear end of a longitudinal shaft **71**. The shaft **71** has a spur pinion **72** keyed or otherwise secured thereto and meshing with and driving a spur gear **73** on a longitudinal shaft **75**. The longitudinal shaft **75** has a spur pinion **76** keyed or otherwise secured to the forward end thereof, meshing with and driving a spur gear **77** keyed or otherwise secured to the rear end portion of a drive shaft **15** for a boring head **17**. The spur gear **77** in turn meshes with a spur pinion **78** on the forward end of a connecting shaft **53**, for driving said connecting shaft and tying the two boring heads together to rotate at the same rates of speed.

When it is desired to vary the cutting width of the machine, the machine screws **61** connecting the back plate **50** to the auxiliary housings **12** may first be removed. The front plate **56** may then be removed to afford access to the machine screws **67**. These machine screws may then be removed. The auxiliary housings are now free to pivot about the bosses **51** and may be moved about said bosses to space the axes of the boring head shafts **15** in the proper spaced relation, to position the boring heads **17** to bore at a selected width. The auxiliary housings then being in the proper positions, may be retained in these positions by machine screws **61** and **67**. The front plate **56** may then be replaced. The two boring heads **17** may thus be driven from the motors **40** and universal couplings **43** in their positions of adjustment about the axes of the connecting shafts **53**.

In the embodiment of the invention illustrated in FIGURES 5, 6 and 7, the motors are fixedly secured to the main supporting housing and primary gear reduction trains driven by the motors are journalled in the main supporting housing. Secondary or final geared reduction trains are journalled in the auxiliary housings, which also form bearing supports for the boring heads **17**.

In this form of the invention the machine is generally similar to that shown in FIGURE 1 except for the structure and arrangement of the main supporting housing and the auxiliary supporting housings. The structure of the main and auxiliary supporting housings together with the geared drive trains therein, therefore, need only be described in detail. The same part numbers will also be

applied to the boring heads, the boring head drive shafts, upper and lower trimmer bars, trimmer chain and hydraulic jacks for supporting the upper trimmer bar, as were applied to the same parts in FIGURES 1, 2 and 3.

In FIGURES 5 and 6 I have shown a main supporting housing **111** having auxiliary supporting housings **112** adjustably mounted thereon and having hubs **113, 113** extending forwardly therefrom and forming bearing supports for boring shafts **115**. The hubs and shafts extend through arcuate slots **114, 114** in a front plate **109** for the main supporting housing. The front plate **109** abuts opposite side walls **116** of the main supporting housing **111**, and is secured thereto as by machine screws **117, 117**.

Individual motors **118, 118** are suitably mounted on and extend rearwardly of the main supporting housing **111** and have motor pinions **119** on the ends of motor shafts **120** and driving spur gears **121** on individual longitudinally extending shafts **122** of primary reduction gear trains. Each shaft **122** has a spur pinion **123** thereon, meshing with and driving a spur pinion **123***a* on a shaft **123***b*. A pinion **123***c* on the shaft **123***b* meshes with and drives a spur gear **124** on a connecting shaft **125**. The connecting shafts **125** in turn are connected together by a timing gear train **126** meshing with the spur gears **124**. Each shaft **125** extends through a hollow boss **127**, coaxial with the center thereof, and has a spur pinion **129** on its forward end, meshing with and driving a spur gear **130** on the boring head support and drive shaft **115**. A primary reduction train is thus journalled in the main supporting housing **111** and drives connecting shafts **125**, and the secondary or final reduction train is driven from the primary gear train through the connecting shafts **125**, and serves as a drive for the associated boring head. The final reduction trains are tied together by the spur gear train **126**.

In this form of the invention the auxiliary housings **112** are retained in position by cap or machine screws **133** (FIGURE 5) extending through selected drilled holes **135** in the front plate **109** in accordance with the position of the auxiliary housing with respect to the main supporting housing, and threaded in registering threaded holes in the main supporting housing.

It may thus be seen that in this form of the invention the motors and primary gear trains are carried by the main supporting housing and the final geared reductions for driving the mining heads are in the adjustable auxiliary supporting housings, which also adjustably support the mining heads to mine working places of varying widths.

In FIGURE 8 I have diagrammatically shown still another form in which the invention may be embodied. In this form of the invention I have shown a main supporting housing **211** and auxiliary housings **212, 212** mounted on the main supporting housing **211** for adjustable movement about the axis of rotation of a central drive gear **213**. The drive gear **213** may be driven from the single motor (not shown) suitably mounted on the main supporting housing **211** for driving the gear **213** through a suitable reduction train housed in the main supporting housing **211**. Auxiliary housings **212** form bearing supports for drive shafts **215, 215**, supporting and driving boring heads **17** in a manner similar to that disclosed in FIGURES 1 through 7. The gear **213** drives the shafts **215** through a gear train **216**, journalled in one auxiliary housing **212**, and a gear train **217** journalled in the other auxiliary housing **212**. The gear trains **216** and **217** have the same reduction, but the gear train **216** has a reversing gear therein to drive the shaft **215** in an opposite dircetion from the shaft **215** driven through the gear train **217**, and thus to effect a drive to the two boring heads **17** in opposite directions and in directions to progress the mined material toward the center of the machine, to be picked up by the conveyor of the machine (not shown).

In this form of the invention the auxiliary supporting housings **212** may be held in the desired positions of adjustment by cap or machine screws (not shown) as in the form of the invention illustrated in FIGURES 2, 3, 5 and 6, or by any other suitable holding means. Lateral adjustment of the boring heads is thus along the broken arcuate lines A, shown in FIGURE 8 as being struck from axes coaxial with the axis of rotation of the gear **213**.

While I have herein shown and described one form in which the invention may be embodied, it may readily be understood that various variations and modifications 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 variable spacing multiple boring head assembly and in combination with a continuous mining machine, a main supporting housing, a plurality of parallel boring shafts supported by said main supporting housing, at least one auxiliary housing carried by said main supporting housing for pivotal adjustment about an axis parallel to one of said boring shafts, means detachably holding said auxiliary housing in adjustment with respect to said main housing said one boring shaft being carried by said auxiliary housing, transmission means carried by said main supporting housing for driving said boring shafts simultaneously including a connecting shaft extending between the main and auxiliary housings and journalled for rotation about the axis of pivotal adjustment of said auxiliary housing whereby the position of said one boring shaft on the main supporting housing can be varied by pivotally adjusting said auxiliary housing about said connecting shaft.

2. In a variable spacing multiple boring head assembly and in combination with a continuous mining machine, a main supporting housing, a pair of auxiliary housings mounted on said main housing for pivotal adjustable movement respectively about a pair of parallel spaced axes, means adjustably holding said auxiliary housings in adjusted relation with respect to said main supporting housing, each auxiliary housing carrying a boring shaft eccentric of and parallel to the corresponding axis, transmission means in said main and auxiliary housings for driving said boring shafts simultaneously including a pair of connecting shafts extending from said main housing respectively into said auxiliary housings and respectively journalled for rotation about said parallel axes whereby the spacing between the boring shafts may be varied while maintaining them both at the same level with respect to one another by similarly pivotally adjusting said auxiliary housings about the axes of their respective connecting shafts.

3. In a continuous mining machine, a mobile main frame, a main supporting housing mounted on said main frame and extending in advance thereof, a pair of laterally spaced rotary boring heads, support means for said boring heads supporting said boring heads on said main supporting housing for adjustable movement toward and from the longitudinal center of the machine including a pair of auxiliary supporting housings, each having a boring shaft journalled therein supporting and driving a rotary boring head and containing reduction gearing for driving said boring shaft, a fixed motor in association with each auxiliary housing, a universal drive connection from each motor to the reduction gearing in the associated auxiliary supporting housing accommodating adjustable movement of said auxiliary supporting housing with respect to the associated motor, connecting gearing journaled in said main supporting housing connecting said boring shafts for rotation together and including connecting shafts driven by the reduction gearing contained in said auxiliary housings, pivotal mountings for said auxiliary housings on said main supporting housing coaxial with the axes of rotation of said connecting shafts and means securing said auxiliary housings in adjusted relation with respect to each other about said pivotal mountings.

4. A continuous mining machine in accordance with claim **3** wherein the main supporting housing has hollow

bosses extending forwardly therefrom having exterior cylindrical wall portions coaxial with the axes of rotation of said connecting shafts and forming pivotal mountings for said auxiliary supporting housings.

5. A continuous mining machine in accordance with claim 3 wherein the means securing said auxiliary housings in fixed relation with respect to said main housing includes a plate extending across the front of said main and auxiliary housings and secured to said main supporting housing and having slots therein in registry with said boring shafts and accommodating adjustable movement of said shafts, and includes securing means securing said auxiliary housings to said plate.

6. A continuous mining machine in accordance with claim 5 wherein the securing means securing said auxiliary housings in adjusted relation with respect to said main housing includes front and back end plates for said main supporting housing secured thereto and extending beyond opposite ends thereof along said auxiliary housings, wherein the back plate has slots therein for the universal drive connections, accommodating adjustable movement of said auxiliary housings with respect to said drive motors, wherein the front plate has slots therein accommodating adjustable movement of said boring shafts and front housings with respect to said front plate and wherein separate securing members extending through said front and back plates and registrable with said auxiliary housings are provided to retain said auxiliary housings in adjusted relation with respect to said main supporting housings.

7. In a continuous mining machine, a mobile main frame, a main supporting housing mounted on said main frame and extending in advance thereof, a pair of auxiliary housings mounted on said main supporting housing for pivotal adjustable movement respectively about a pair of spaced parallel axes, means holding said auxiliary housings in adjusted relation with respect to said main supporting housing, each auxiliary housing carrying a boring shaft eccentric of and parallel to the corresponding parallel axis, transmission means in said main and auxiliary housings for driving said boring shafts simultaneously at the same rates of speed including a pair of connecting shafts extending from said main supporting housing respectively into said auxiliary housings and respectively journaled for rotation about said parallel axes, whereby said boring shafts extend forwardly from said auxiliary housings in a horizontal direction and the spacing between the boring shafts may be varied while maintaining said boring shafts both at the same level with respect to one another by similarly pivotally adjusting said auxiliary housings about the axes of the respective connecting shafts, and wherein the connecting shafts are disposed at the level above and at lease as close to the center of the main supporting housing as its corresponding boring shaft whereby the level of the two boring shafts is automatically elevated as their spacing is increased by simultaneously pivotally adjusting said auxiliary housings.

8. In a continuous mining machine, a mobile main frame, a main supporting housing mounted on said main frame and extending in advance thereof, a plurality of parallel boring shafts having boring heads supported thereon and rotatably driven thereby, supported by said main supporting housing, an auxiliary housing mounted on said main supporting housing for pivotal adjustment about an axis parallel to said one shaft and spaced therefrom, at least one of said shafts being carried by said auxiliary housing and means holding said auxiliary housing in adjusted relation with respect to said main housing, transmission means carried by said main supporting housing for driving said boring shafts simultaneously including initial speed reducing gearing and a connecting shaft extending between the main and auxiliary housings and journaled for rotation about said axis and interconnecting said initial and final speed reducing gearing, whereby the position of said one boring shaft on the main supporting housing can be varied by pivotally adjusting said auxiliary housing about said connecting shaft and securing said auxiliary housing in a selected position of adjustment.

9. The combination of claim 8 in which the final speed reducing gearing includes speed reducing gearing for connecting the boring shaft to one power source, one gear of which is meshed with a gear of said connecting shaft, the latter having an additional gear adapted to be connected to another power source to render both of said power sources effective for driving said boring shaft.

10. The combination of claim 8 in which each connecting shaft interconnects one corresponding set of initial and final speed reducing gearing and wherein connecting gearing is provided and extending across said main supporting housing for interconnecting said connecting shafts for rotation simultaneously with one another to correlate the rotation of said boring shafts.

11. In a continuous mining machine, a mobile main frame, a main supporting housing mounted on said main frame and extending in advance thereof, a pair of auxiliary housings mounted on said main supporting housing for pivotal movement respectively about a pair of spaced parallel axes, means adjustably holding said auxiliary housings in selected positions of adjustment with respect to said main supporting housing, each auxiliary housing carrying a boring shaft eccentric to and parallel to the corresponding axes and each boring shaft supporting and driving a rotary boring head, transmission means in said main and auxiliary housings for driving said boring shafts simultaneously including a pair of connecting shafts extending from said main supporting housing respectively into said auxiliary housings and respectively journaled for rotation about said parallel axes, one set of gearing for driving said one of said boring shafts from one power source and another set of gearing for driving the other boring shaft from another power source, said connecting shafts each having a first gear meshed with a respective set of said gearing and having a second gear means extending across said main supporting housing and interconnecting said first gears with one another, whereby both power sources are connected to drive both boring shafts simultaneously and the power of both sources will be applied automatically to either boring shaft as needed, and whereby the spacing between the boring shafts may be varied while maintaining them both at the same level with respect to each other by similarly pivotally adjusting said auxiliary housings about the axes of their respective connecting shafts and fixedly securing said auxiliary housings in their selected positions of adjustment.

12. A variable spacing multiple boring head according to claim 11 in which each of the connecting shafts is disposed at a level above and at least as close to the center of the main supporting housing as its corresponding boring shaft, whereby the levels of the two boring shafts are automatically elevated as their spacing is increased by simultaneously pivotally adjusting said auxiliary housings.

13. A variable spacing multiple boring head continuous mining machine in accordance with claim 12 wherein spaced front and back plates for said main supporting housing extend along said auxiliary housings and have slots therein to accommodate adjustment of said auxiliary housings with respect to said main supporting housing and form a means for securing said auxiliary housings in fixed relation with respect to said main supporting housing.

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ERNEST R. PURSER, *Primary Examiner.*

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,288,534 November 29, 1966

Joseph Gonski

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.

Column 1, line 51, for "housing" read -- housings --; column 5, line 68, for "dircetion" read -- direction --; column 7, line 53, for "lease" read -- least --; line 71, after "gearing" insert -- , final speed reducing gearing, --.

Signed and sealed this 12th day of September 1967.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents