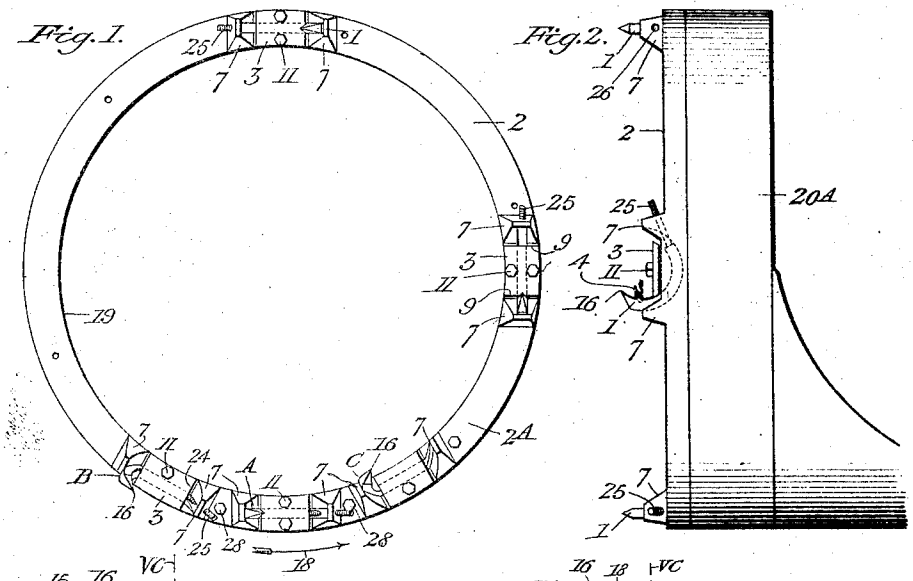
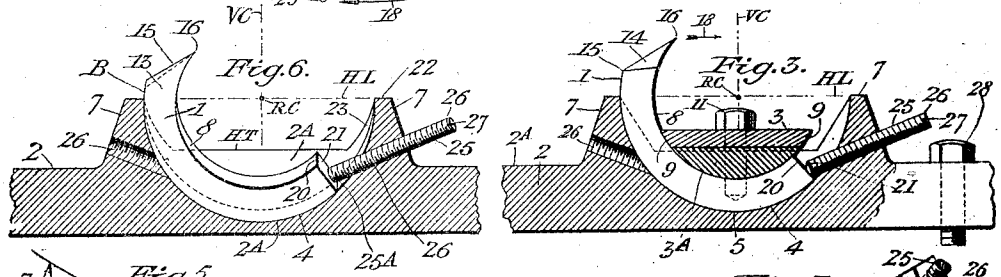
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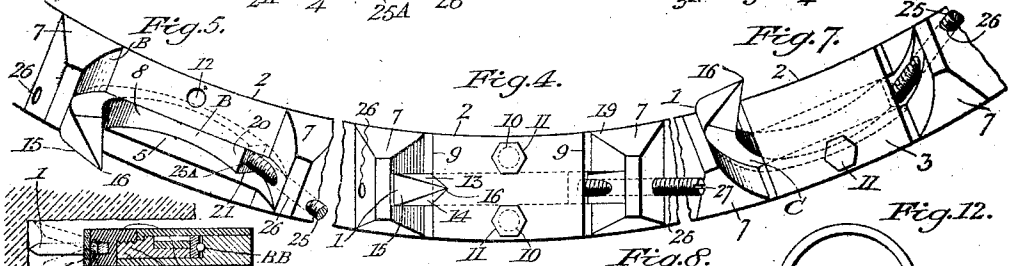
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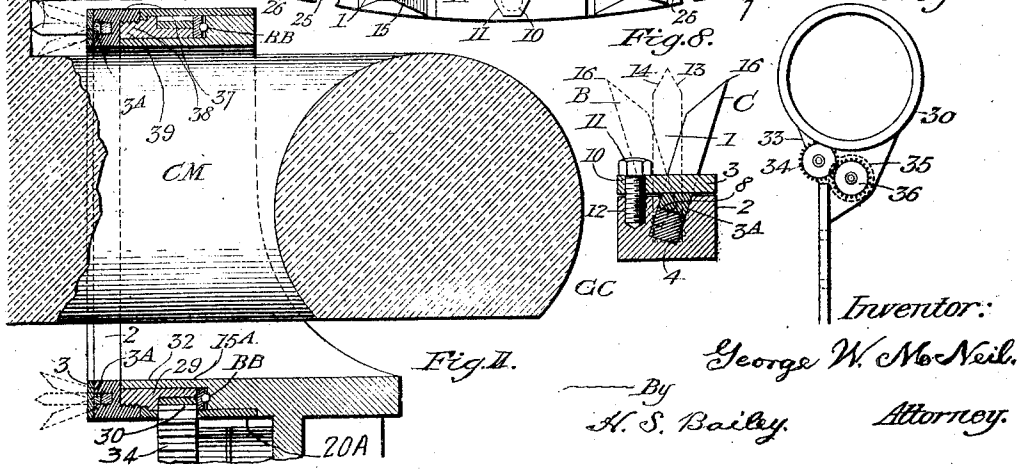
REVERSIBLE AND ADJUSTABLY FEEDING ROTATABLE RING FOR CUTTING COAL AND OTHER MINERAL DEPOSITS

Filed Aug. 12, 1924 2 Sheets-Sheet 1









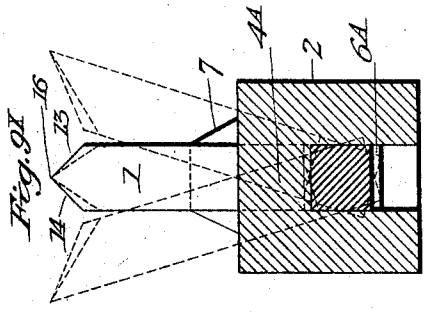
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George W. McNeil.
By
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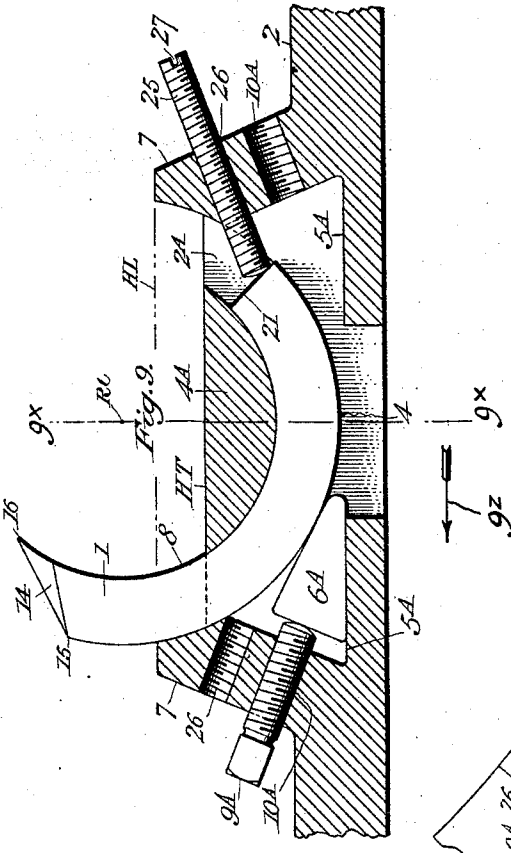
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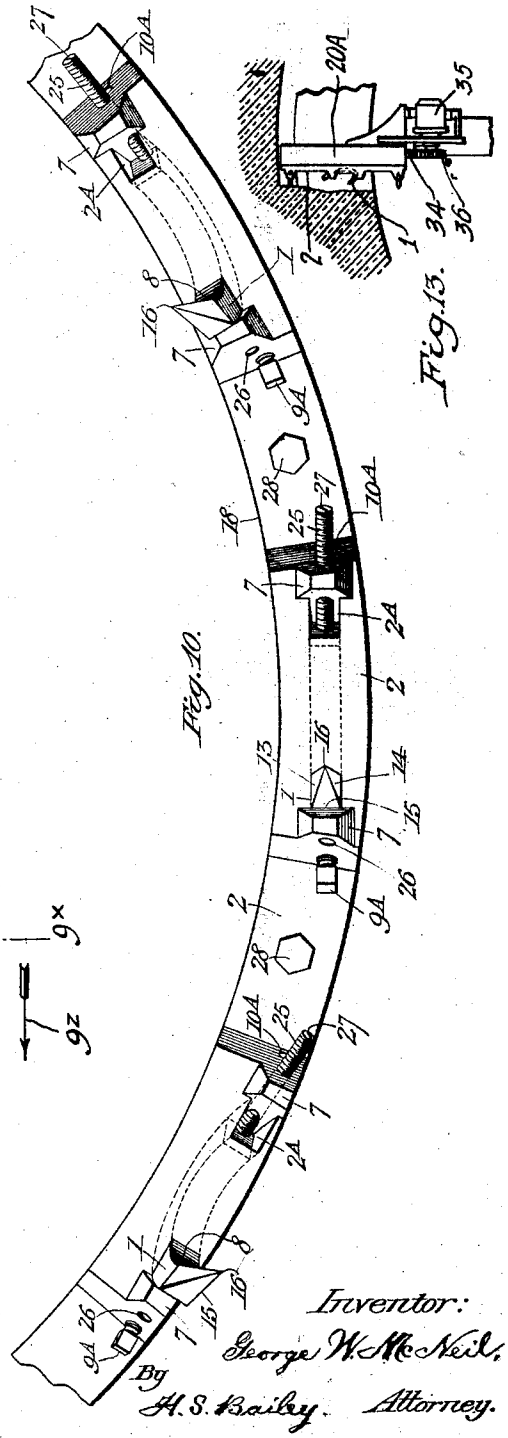
G. W. McNEIL

REVERSIBLE AND ADJUSTABLY FEEDING ROTATABLE RING FOR CUTTING COAL AND OTHER MINERAL DEPOSITS

Filed Aug 12, 1924 2 Sheets-Sheet 2







Inventor:
George W. McNeil.
By H. S. Bailey. Attorney.

Patented Aug. 18, 1925. 1,550,088

UNITED STATES PATENT OFFICE.

GEORGE W. McNEIL, OF DENVER, COLORADO.

REVERSIBLE AND ADJUSTABLY FEEDING ROTATABLE RING FOR CUTTING COAL AND OTHER MINERAL DEPOSITS.

Application filed August 12, 1924. Serial No. 731,589.

To all whom it may concern:

Be it known that I, GEORGE W. McNEIL, a citizen of the United States of America, residing at the city and county of Denver and State of Colorado, have invented a new and useful Reversible and Adjustably Feeding Rotatable Ring for Cutting Coal and Other Mineral Deposits, of which the following is a specification.

My invention relates to a new reversible and adjustably feeding rotatable ring for cutting coal and other mineral deposits.

And the objects of my invention are:

First. To provide a circular groove cutting and core forming rotatable ring for mining coal oil shale, and other mineralized beds of sedimentary deposits entirely independent of and without the use of explosive blasting operations.

Second. To provide a circular groove cutting and a core forming rotatable ring through which the cores move and fall by gravity from the opposite side of the ring from its cutting bit members and that is especially adapted to cut semi-round shaped cores from veins of coal in coal mines and other mineral deposits and that consists of an endless ring member that is provided with a circumferential row of semi-circular shaped sockets, each of which radiates from a radial center in the top edge of said ring at each socket member and that also consists of a plurality of mineral cutting bits that are concentrically situated in said sockets and are also reversible in them end for end and that can be adjustably moved in said sockets to compensate for their wearing away of either of their reversible positions in said socket and also in which the cutting bits are arranged in circumferential rows of independent and separable coal or other mineral cutting bits and in which the rows are arranged in zigzag formation around the circumferential surface of the ring and that are spaced at equal distances apart around the circumference of said ring and in which a set of cutting bits cut out the mineral above the central portion of said ring, and the other circumferential rows of bits are arranged to extend beyond and cut out a groove in coal or mineral wider than the cutting ring and in which the core formed by said ring moves through the ring and falls by gravity from the opposite side of the ring from its cutting bit. and to provide a cutting ring that can be quickly attached to and detached from any operative rotating mechanism to which it may be attached and a new ring placed on its rotative mechanism in a very few seconds of time.

Third. To provide a groove cutting and core forming and separating ring for mining coal and other minerals that will take the place of the explosive blasting operations now in general use, and that will cut grooves in the breasts of tunnels or along the side walls or pillars of beds of coal, oil shale, or other mineral containing deposits and form large core members that will vary from about thirty inches to sixty inches in diameter and that will weigh from one to several tons in from five to eight feet of their length dependent upon the diameter of the groove cutting ring and of the core, and the size of the core forming circumferential space through the ring; and that will extract as much coal or other mineral in the same time and at less expense than the blasting methods now in use.

I attain these objects by the mechanism illustrated and described in the accompanying drawings which comprise a cooperating semi-circular curved mineral cutting bit and a supporting and rotating ring mechanism.

Figure 1, is a side elevation of a coal and other mineral cutting bit and its supporting member, that embodies my invention.

Figure 2, is an end elevation of my coal and other mineral cutting bit, shown in Figure 1.

Figure 3 is a sectional side elevation of an enlarged view of a fragmentary part of the supporting rings showing a full sized view of my mineral cutting bit in its supporting socket, and illustrates the manner of securing the cutting bit to the supporting ring and for adjustably moving it and its cutting point forward as it wears away.

Figure 4 is a plan view of Figure 3.

Figure 5 is an enlarged fragmentary sectional view of a fragment of the supporting ring, showing the left hand cutting bit projecting from its socket in the supporting ring and extending upwardly to and over beyond the left hand side of the supporting ring.

Figure 6 is a side elevation of Figure 5, showing a fragment of the ring in section.

Figure 7 is an enlarged fragmentary view of the right hand cutting bit, showing it projecting upwardly from the center of the supporting ring and projecting over the right hand side of the cutting ring. A side elevation of Figure 7, would be similar to the side elevation of Figure 6, of the left hand cutting bit described in Figure 6.

Figure 8 is a full sized section of the supporting ring 2, showing the three independent and separated mineral cutting bits in their operated mineral cutting positions relative to each other and to the center and opposite side edges of the supporting ring.

Figure 9, illustrates a modification of the construction of the sockets of the ring 2, that support the cutting bits, and of the means for securing the cutting bits in the sockets.

Figure 9X, illustrates a cross sectional view of Figure 9, on lines 9^x—9^x, showing a part of the ring 2, in cross section, and also showing the wedge 6^A in dotted lines.

Figure 10, illustrates a plan view of a short section of the whole ring 2, and it illustrates a modification in the construction of the cross lugs 7, the sockets 2^A, and the cutting bits, shown in Figures 3 and 6, and it shows the difference in the construction and arrangement of these parts, from the construction and arrangement shown in my preferred construction, Figures 1 to 8.

Figure 11, illustrates a method of threadedly securing the cutting ring 2, to its supporting gear ring 30, and it also shows the manner in which the cutting bit cuts a groove and forms a core in coal or other mineral.

Figure 12, shows the cutting ring's rotating mechanism.

Fig. 13, is a side view of Fig. 12 showing the connection between the cutting ring and driving mechanism therefor.

Similar letters of reference refer to similar parts throughout the several views.

Referring to the drawings: The numeral 1, designates one of the many coal cutting bits of my coal cutting ring, each one of which is in the shape of a true, round circle along its outer and inner peripheral surfaces. It is, however, made substantially one half of a full semi-circular portion of a full circle in length, and it is clearly shown in Figures 3, 4, 6 and 8, in its semi-circular socket in its supporting ring.

The reference numeral 2, designates the endless supporting ring member that supports the cutting bits of my core forming ring in semi-circular sockets 2^A formed in it.

The reference numeral 3 designates a flat thin clamping plate which I use to clamp the outside peripheral surface 4, of my mineral cutting bit against the true circular curved socket 5, that is formed in the outer peripheral surface of the supporting ring 2, and that is also formed between two upwardly projecting lugs 7, in which they are formed preferably on and integrally with the ring 2, and it clamps a clamping block 3^A under it against the inner peripheral surface of the cutting bit.

The clamping plate 3 is preferably made of the same width as the supporting ring 2, which preferably is about two inches wide by about an inch thick; and the clamping plate is made to fit between the upwardly curved ends of the semi-circular curved cutting bit above its supporting socket and it is clamped against or close to the inside peripheral surface 8, of the full true circular outline of the cutting bit by the cap screws, and its opposite ends 9 are curved to fit against the inside curved surface of the mineral cutting bit 1. This clamping plate 3, is provided with two holes 10, which are placed on opposite sides of the circle of plate 3, and the clamping plate is secured to the supporting ring 2, by cap screws 11, which extend loosely through threaded holes 10, and are threaded into thread holes 12, that are formed in the outer peripheral surface of the supporting ring 2.

The mineral cutting bits 1, of which I preferably use twelve in the circumferential surface of the supporting ring 2, are preferably made of the finest self hardening tool steel and are formed to give the longest possible mineral cutting use, and I arrange these twelve bits in three independent and separated rows of four cutting bits in each row.

My invention, however, contemplates the use of more or less than twelve of these mineral cutting bits in the circumference of the ring 2, and it also contemplates the use of more than three independent and separated rows of cutting bits, depending on the character of the mineral they are to cut, and the diameter of the supporting ring 2, and the speed at which they are to be rotated to secure the most economic and effective results.

I find in practice, however, that three independent rows of cutting bits, each row of which is wholly independent of the other rows, gives perfectly satisfactory mineral cutting and core making results. I adjustably secure them to the center of the width of the supporting ring 2, and arrange them as follows:

The four cutting bits of each independent row are placed at equal distances apart in alternate order of arrangement and they are each housed and supported and secured in semi-circular recessed sockets formed in the outer circumference of the supporting ring and their cutting points project upwardly above the ring 2, as shown in Figure 3, and the cutting points of the three circular rows

of cutting bits project forwardly in the rotating plane of the supporting ring which is in the direction of the arrow 18.

The center row of cutting bits have their cutting points taperingly pointed as follows:

They taper on their opposite sides 13 and 14 and on their outer peripheral edges 15 to a point 16 which terminates at the edge of the inner peripheral circle 8 of the bit.

The other two outside independent rows of cutting bits are supported in zigzag order with the center row of bits and with each other around the ring 2, but they and their sockets are slightly inclined outwardly and obliquely across and from the center of the ring towards the opposite edges of it and the cutting points extend beyond it far enough to cut a groove in coal or other mineral wider than the width of the ring 2.

Consequently, these three independent and separate circumferential rows of coal or other mineral cutting bits, will cut a groove, when rotating in mineral, wider, both above and around the supporting ring 2, than its width. Each one of my semi-circular or segmental shaped mineral cutting bits 1, can be made of any shaped piece of tool steel in cross section that has one or more flat sides, such as a flat sided round piece or a V-shaped, or an octagonal, or any polygonal shaped piece of tool steel. I preferably, however, make it of self hardening tool steel that is preferably one-half inch square, and its inner and outer curved peripheral surfaces 4 and 8 are made truly concentric to each other and to their radial center RC. The radial center RC of the cutting bit is also the radial center of the semi-circular recessed socket 5, against which the outside circular peripheral surface 4 of the cutting bit 1 fits accurately and slidingly, and on which it rotatably curves pivotally around the radial center RC as its cutting point 16 is either raised or lowered in adjusted mineral cutting positions between its horizontal or tangential line HT and its vertical line VR.

The outside diameter of my semi-circular of segmental mineral cutting bit 1 is preferably about three and one-half inches in diameter across its radial center RC, and its cutting point 16 does its most effective coal or mineral cutting work when positioned at about half way between the horizontal or tangential lines HL of the radial center RC and the vertical radial line VR—see Figure 3.

The center row A of the cutting bits 1, with their sockets 2^A are positioned in the center of the width of the ring 2, and their cutting points point straight ahead and upwardly. The left hand cutting bits B stand at an oblique angle to the center of the ring and each taperingly pointed coal cutting end is bent outwardly enough to cause its points 16 to engage and cut the mineral away beyond the left hand side edge 17 of the ring 2, without its straight side 14 engaging the mineral. The remaining four cutting bits C, are right hand mineral cutting bits and they are also secured in the sockets which are obliquely inclined towards the right hand side edge 19 of the ring 2, and they project upwardly toward the right hand side of the ring 2, and their mineral cutting end portions and their cutting ends project over and beyond the right side edge of the ring 2, and are also beveled off and pointed the same as the left hand cutting bits, but opposite from them, so that their cutting points 16, cut the coal or other mineral away from and beyond the right hand side edge 19, of the ring, thus making in the coal or mineral bearing veins or formations a groove wider than the supporting ring 2, and cutting out from the coal veins or mineral formation a core member CM, shown in Figure 11, that passes through the supporting ring as it is fed sidewise or at right angles to the direction of the rotary movement of the ring 2, and to the circumferential diameter of the ring 2, into the coal veins or mineral formations.

In Figure 8 a section through the supporting ring is shown in which the three cutting bits are shown in their relation to each other and to the supporting ring 2, and the distance that the cutting points of their right and left hand cutting bits project beyond their opposite side edges on the supporting ring 2 is plainly seen in this sectional view and the upwardly outwardly inclined pitch of the right and left hand cutting bits from their supporting sockets at the center of the supporting ring 2 is plainly seen in Figures 8 and 9 and the oblique inclination across the center of the width of the ring 2 of these right and left hand cutting bit supporting sockets is also plainly seen in Figures 8 and 9 and also the tilt of the bottom of the sockets.

A full detailed description of the two outside rows of cutting bits is as follows:

Each of these outside rows of cutting bits consists of four cutting bits B, and four cutting bits C, and each group extends above their supporting sockets 5 at the same height above them as the center row of bits A, and as before said, the sockets of these two outside rows of bits although they are in the center of the width of the ring they are positioned in slightly oblique angles across it, and these opposite diverging angles of the sockets causes the outside cutting bits to stand in opposite directions towards the opposite end edges of the ring 2 and they are positioned so that their cutting points extend over and beyond the opposite sides of the ring 2, and all of their cutting points extend in the same direction of rotation as the cutting points of

the cutting bits A, and of the ring 2, as indicated by the arrow 18.

I will now describe in detail the cutting points of each of the left hand cutting bits B, which are made differently from the cutting points of the semi-cutting bits A. Their side 13 is left straight and its outer peripheral edge 15 is not beveled inwardly but is made to point upwardly at a sharp angle as is shown in Figure 8 while its inner peripheral surface 8 is beveled off at a sharp angle to a point 16 at its upper edge 15.

The rear end 20 of the bit as illustrated, terminates in a square shouldered end 21, that is normally positioned at a short distance below the top end 22, of the adjacent lug 7, at the end portion 23, of the socket 2^A, and just below the end 24, of the clamping block 38, which insures that this inner end of the cutting bit will be tightly clamped in the socket by the clamping plate 3. The threaded screw 25 is threaded through a threaded hole 26, formed at a slightly downward angle through the lug 7, and it projects through the lug 7, and beyond it, and its inner end 25^A, bears against the shoulder 21.

The outer end 26, of the threaded screw 25, is provided with a screw driver slot 27 by which the screw may be turned to move against the shoulder 22, of the cutting bit 1, and then move the bit when its clamping plate is loosened to turn upwardly in its curved socket 5, which moves its tapered cutting bit end upward further above the tops of the projecting lugs 7.

A similar threaded aperture 26 is made in the opposite projecting lug 7, and the screw 25 can be transferred to it and the cutting bit can be reversed in the socket so its cutting point 16 will be on the side where its end 20 is now, but when the cutting bit is reversed end to end in the socket, the rotating direction of the cutting ring 2, must also be reversed to rotate the ring 2, in the direction opposite to the direction the arrow 18 is pointing.

My adjustable forwardly feeding and reversible cutting bit and its supporting ring is adapted to be secured by the cap screws 28 to a rotating gear supporting ring 29 and its attached gear ring 30 which are connected together to form one single ring which I will term the rotating gear-ring 30, which is rotatably mounted on ball bearings BB in a stationary ring 32, that consists of two ring members 15^A and 20^A. This stationary ring 30 has a rearwardly projecting plate portion 33 on which a pinion 34 is mounted, a motor 35, is also mounted on the plate, the motor 35 has a pinion 36 on its driving shaft which meshes with the pinion 34 and rotates it, and the pinion 34, meshing with the gear ring 30, rotates it, and as my cutting ring is attached to the gear ring 30, it is so rotated by it, and consequently, my gear ring's driving mechanism is mounted on the rear part of the stationary ring. This stationary casing 32, is secured to a swinging bar, that is attached to and operated by suitable operating mechanism that is arranged and adapted to move the cutting ring and its supporting ring and rotating mechanism horizontally and also vertically, and to feed the cutting ring and its supporting ring members sidewise, and to rotate the cutting ring in its circumferential plane, into coal or other mineralized matter with a steady and adjustable side pressure, and as it cuts a groove, it automatically leaves a core, GC, which extends through the cutting ring, and as the cutting ring advances into the coal, and the core as it is formed, breaks off from the groove by its own weight, and falls by gravity onto the end of a conveyor which conveys it to and discharges it into transportation cars. I do not illustrate the conveying mechanism, and also I do not illustrate the mechanism for exerting the side pressure feeding movement on the cutting ring, or the horizontal or vertical swinging movement, or the forward or backward movements of the cutting ring mechanism in this application, but it is fully illustrated and clearly described in my pending application Serial Number 699,294, filed in the United States Patent Office, on the 14th day of March, 1924.

My present cutting ring can be secured to the gear ring 30, either with the cap screws 28, or by a threaded connection which I illustrate in Figure 11. In this threaded connection, the inner peripheral surface of the supporting ring 2, is provided with a threaded counterbored portion 37, and the outer end 38, of the supporting gear 30 is provided with a similar counterbored offset portion 39, that is threaded to allow the ring 30 to be screwed onto the threads on the ring 2, and the gear ring 30 must have left handed threads when the cutting ring rotates in the direction of the arrow 18, and they must be right hand threads when the cutting ring 2 is rotated in the opposite direction, in order to prevent the cutting ring from accidentally turning off of the gear ring 30.

The endless supporting ring member 2, of my cutting ring, is provided with preferably twelve true semi-circular shaped sockets 5, and these sockets are formed between lugs 7. They are formed on the outside surface 2^A of the ring 2, in pairs of projecting lugs 7, that are placed just far enough apart to form between each pair of lugs a semi-circular shaped recess 5 in their opposing surfaces, and in that portion of the ring that lies between them, and there are pairs of these lugs cast on the ring at twelve equal distances apart, in order to receive the twelve semi-circular shaped cutting bits that

I preferably use in each ring. Each recess formed between these projecting lugs 7, is a true circular curved semi-circular shaped recess from the top of the right and left-hand lugs 7, throughout the length of its semi-circular curve, as it is made from the radius of the center RC, and from the top of one lug 7 to the top of the next lug 7. The ring 2 between these two projecting lugs, is made a little thicker than the ring is made between each pair of the lugs 7, in order to have metal enough to make a full semi-circular recess in the ring 2 for the cutting bits to fit into, and as the cutting bits fit into the recess and bear against the left-hand lug 7 throughout its outside curved form to close up to its cutting point they are very firmly supported by the left-hand lug 7 which forms a strong abutment for the coal cutting points of the cutting bits when they are forced into a vein of coal by the rapidly rotating ring 2, and the cutting bits are clamped tightly down into their semi-circular recesses by the two cap screws 11, which extend loosely down through the clamping plate 3, and extend also loosely through the block 3^A on opposite sides of the semi-circular recess 4 and screw into the ring 2.

In Figures 9, 9X, and 10, three views of a slight modification of my cutting ring 2, are illustrated. In this modification Figure 9, shows a section through the ring 2, that supports the coal and other mineral cutting bits, and as illustrated in Figure 9, the ring 2, is cored out from its under side and moulded in such a manner as to leave an integral center portion 4^A, of the ring 2, centrally between the lugs 7, and the under side of this center portion 4^A is curved with a curvature of an arc of a true circle which is concentric to the inner peripheral edge 8, of the square cutting bit 1, which is illustrated fitting up against the curved inner side of the central portion 4^A, of the ring 2.

The ring 2, is also cored out to form two flat surfaces 5^A, and two of these surfaces are illustrated, one on each side of the center of the central portion 4^A, but a little below it, and they form the lower part of two triangular spaces that are bounded by the lines 7^A.

A wedge 6^A, is seated on the flat surface 5^A, and it is pressed up against the under side of the outer peripheral surface 4, of the cutting bit 1, by a set screw 9^A, which is threaded into and threaded through a threaded aperture 10^A, formed in the adjacent lug 7, below the threaded aperture 26, which is made to receive the forwardly feeding screw 25.

A similar threaded aperture 10^A is also formed through the opposite lug 7, below the threaded aperture 26, in which the cutting bit's forwardly feeding screw 25 is shown, with its inner end bearing against the square end 21, of the cutting bit 1.

The set screw forces the wedge against the outer peripheral surface of the bit 1, and forces the bit 1 against the integral center portion 4^A, of the ring 2; thus holding it securely in its socket between the wedge and the center piece 4. Should the cutting ring be reversed in its socket, the wedge 6^A, would be placed in the opposite triangular space on the flat surface 5^A, and the set screw 9^A, would be transferred from its present hole 10^A, to the opposite threaded hole 10^A, and the feeding screw 25, would also be reversed from its present lug 7, to the threaded hole in the opposite lug 7. In Figure 9^A, I illustrate a cross section of the ring 2, and in which an end view of the wedge 6^A in dotted lines and the cutting bits are shown; the wedge 6^A, is made a trifle narrower than the one-half inch square semi-circular shaped cutting bit 1, which is of the same width and semi-circular length and pointed in the same manner as the cutting bits in the figures of my preferred construction. The wedge 9^A, is made in the form of a triangle of unequal sides in length.

In Figure 10, I illustrate a plan view of a short segment of the entire diameter of the ring 2, showing the arrangement of the lugs 7, and of the cored sockets 2^A. In this modification, the lugs 7, are reduced in their length across the ring 2, and they are positioned directly in alignment with the cap screw, and the feeding screw, and the right hand and left hand cutting bits and their sockets are arranged near their respective sides of the ring 2 and at substantially tangential angles to the circumferential center of the ring.

This modification embodies, by means of its cored semi-circular shaped recesses for the cutting bits, and also its wedge shaped clamping means for securing the cutting bits in their sockets, a more economical arrangement of the holding means of the cutting bits in their sockets than in my preferred construction, inasmuch as it does away with the clamping plate 3, and the clamping block 3^A, and the clamping cap screws.

In my preferred construction, Figures 1 to 8, the sockets are positioned along the center of the width of the ring 2, and the right hand and left hand sockets of the cutting points are obliquely inclined across the center of the width of the ring in opposite directions, but my invention contemplates these sockets arranged in any predetermined manner either as shown in the modifications or in my preferred construction; if desired, all of the sockets can be made directly in end to end alignment throughout the circumferential center of the ring 2, and in that case the cutting points of the cutting bits of the right and left hand

bits can be bent outwardly to project over their respective sides of the ring 2.

The clamping block 3A, is placed under the clamping plate 3, and its lower surface is curved to fit against the inner peripheral surface of the cutting bit. The clamping block 3, and the clamping block 3A, are illustrated in section in Figure 3.

The inner end 20 of the cutting bit is terminated with a square end to form a shoulder 21, at a short distance below the top of the adjacent lug 7, and the inner end of the feeding screw 25, bears against it, and my cutting bit, as illustrated, is preferably made of a full semi-circular part of a full circle that is one-half of a full circle in length. My invention, however, in this respect contemplates these cutting bits being made either a little longer or a little shorter than a full semi-circle, as they will grow shorter as they wear away, and their length and size depends on the diameter of the ring in which they are to be placed.

My combined adjustably forward feeding and reversibly mounted semi-circular shaped coal and other mineral cutting ring with its taperingly pointed cutting bits and its supporting ring, and with its individually arranged and separated rows of cutting bits, provides a coal cutting ring that is easily and quickly secured to and removed from the gear ring and its rotating mechanism, and it should be rotated at about 750 to 850 feet per minute, and it automatically cuts a groove that forms and leaves a core shaped piece of coal or other mineral of from about thirty to sixty inches in diameter, depending on the diameter of the cutting ring, consequently my cutting ring is adapted to mine a large tonnage of coal per working day as it can be operated practically continuously, and it abrogates the blasting system of mining and thus practically eliminates the danger of miners getting injured in mining operations.

My invention provides a light weight and consequently a very easily and quickly handled, and a highly efficient coal and other mineral matter cutting ring, and while I have illustrated and described the preferred construction and arrangement of my reversibly and adjustably forward feeding coal and mineral cutting ring, I do not wish to be limited to the construction and arrangement shown as many changes may be made in it without departing from the spirit of my invention.

Having described my invention what I claim as new and desire to secure by Letters Patent is:—

1. A coal or other mineral mining ring arranged and adapted to cut grooves and form and extract cores from their veins and deposits consisting of a vertically positioned supporting ring provided with independent rows of cutting bits, each of which is provided with a shoulder; said supporting ring provided with pairs of projecting lugs, each pair of which is provided with a semi-circular socket arranged to rotatably support a cutting bit, said supporting ring being provided with downwardly and inwardly inclined threaded holes extending from the outside surface of said projecting lugs into the opposite ends of said socket, and a screw driver operated screw threaded into one of said holes of each socket in engagement with the shoulder of said cutting bit and changeable into the opposite threaded holes in each socket, said cutting ring being attachably and detachably secured to a rotating mechanism.

2. The combination in a core forming mineral cutting bit and ring mechanism for mining coal and other mineral deposits; of a supporting ring arranged to allow a core to pass through it, provided with a plurality of raised lugs positioned at predetermined distances apart, on its outside peripheral surface, and a true circular curved shaped flat bottomed semi-circular recess form of socket in each pair of said projecting lugs; with a true circular curved square cross sectioned semi-circular shaped mineral cutting bit rotatably mounted in each socket, said sockets being arranged in three groups, each group of cutting bits comprising four sockets placed at equal distances apart and arranged in alternating order around the said ring, one group having cutting bits standing with their cutting points in the center of the width of said ring, another group having their cutting points projecting to and beyond the right hand side of said ring at predetermined distances apart and the other group having their cutting points projecting to and beyond the left hand side of said ring at predetermined distances apart, the right and left hand bit holding sockets being positioned to stand at slight oblique angles across the center of the width of the side of said ring; and means for rotating said cutting ring.

3. In a coal or other mineral mining ring; the combination of the semi-circular cutting bits; with a supporting ring provided with a socket for each cutting bit, each of said sockets extending into said ring from the opposite side of said ring from each cutting bit; said sockets being arranged to leave a central portion of said ring in the center of its outer surface, the said central portion of said ring in each socket having a curved inner side around which said cutting bit fits, a wedge seated in said socket and bearing against said cutting bit, a cap screw extending through said ring into said socket against said wedge and arranged to clamp said cutting bit

against the inner curved portion of the central portion of said ring, and a screw extending through said ring into said socket and bearing against the inner end of said cutting bit, and arranged to feed said cutting bit out of said socket.

4. In a coal or other mineral mining ring; the combination of a ring provided with three circumferential rows of separate and independent cutting bits arranged in any predetermined order, projecting lugs arranged in pairs around the circumference of said ring, each pair being arranged a short distance apart; said ring being provided with sockets opening into said ring on its opposite side from its cutting bits, said socket being arranged to leave a portion of said ring in the center of the socket between its lugs, said center portion having a circular curved inner side; the interior of said sockets being provided with two flat portions on opposite sides of said central portion of said ring, a wedge seated on one of said flat portions, a set screw threaded through one of said lugs, and engaging the large end of said wedge, a semi-circular shaped cutting bit seated around and against the central portion of said ring and adapted to be clamped thereto by said wedge and set screw; and a forwardly feeding cutting bit screw extending threadedly through the opposite lug and engaging the inner end of said cutting bit, the lugs in both ends of each socket being provided with screw receiving apertures and with supporting surfaces and wedges in their opposite ends whereby said cutting bits and the wedges and their moving screws can be reversed in said sockets from one side to the other in each socket.

In testimony whereof I affix my signature.

GEORGE W. McNEIL.