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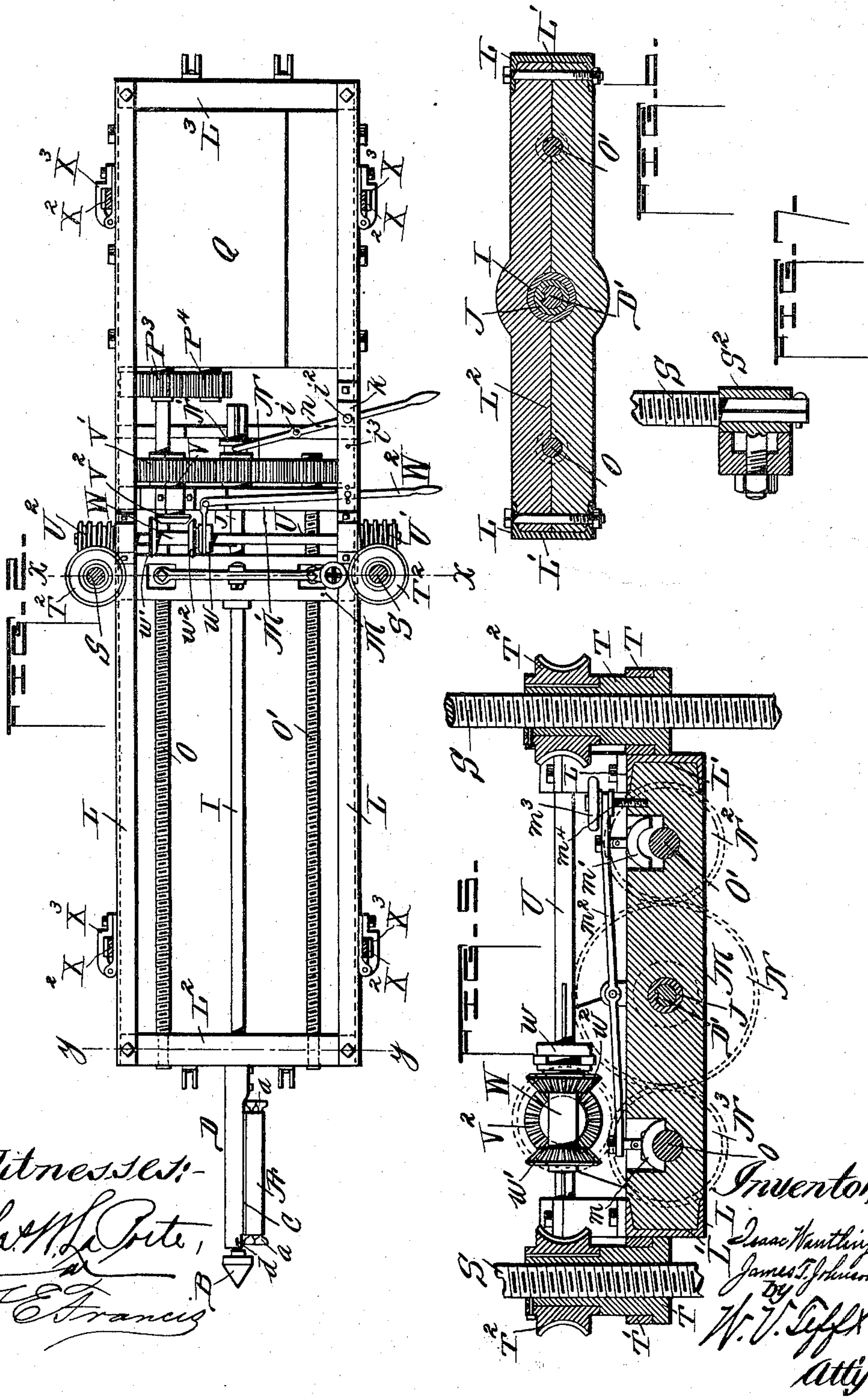
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I. WANTLING & J. T. JOHNSON.
COAL CUTTING AND MINING MACHINE.

(Application filed Mar. 5, 1897.)

(No Model.)

3 Sheets—Sheet 2.



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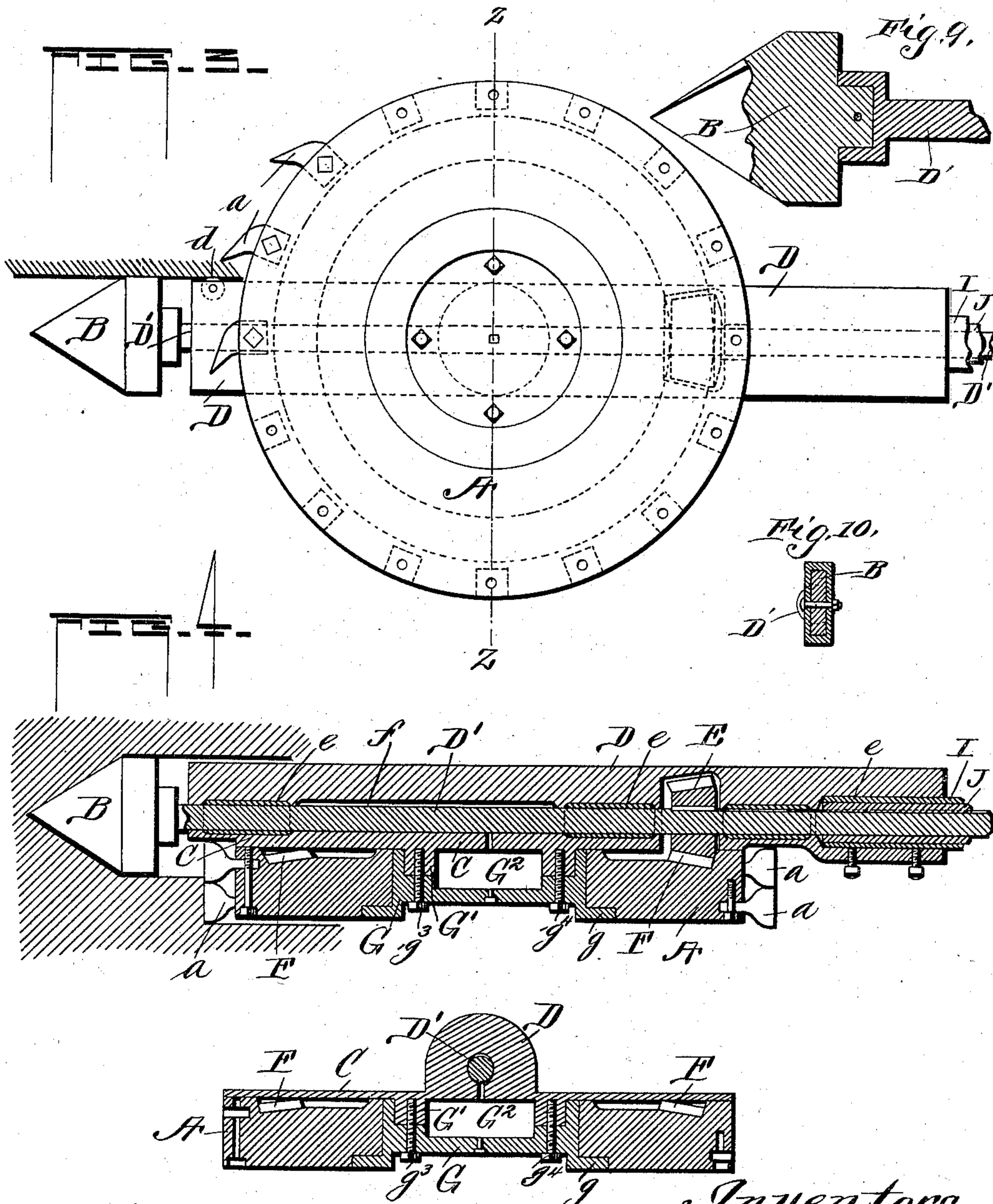
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UNITED STATES PATENT OFFICE.

ISAAC WANTLING AND JAMES T. JOHNSON, OF PEORIA, ILLINOIS.

COAL CUTTING OR MINING MACHINE.

SPECIFICATION forming part of Letters Patent No. 608,240, dated August 2, 1898.

Application filed March 5, 1897. Serial No. 626,059. (No model.)

To all whom it may concern:

Be it known that we, ISAAC WANTLING and JAMES T. JOHNSON, citizens of the United States, residing at Peoria, in the county of Peoria and State of Illinois, have invented certain new and useful Improvements in Coal Cutting or Mining Machines; and we do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to certain new and useful improvements in coal cutting or mining machines by means of which a machine is provided that is well adapted for the purpose designed.

More particularly our invention relates to a machine adapted to cut vertical or transverse openings in the body of the coal and is susceptible of adjustment to facilitate in such cutting.

Our invention consists, essentially, of a revoluble cutter-head provided with cutting-tools, an auger or bit mounted to travel in front of the cutting-head, to means for revolving and guiding the cutter-head and bit or auger, to means for adapting the same to be adjusted to cut at any angle desired, to means for supporting the working parts of the machine for raising and lowering the machine and for feeding it forward, and to various other details of construction hereinafter more particularly specified, and pointed out in the claims.

That our invention may be more fully understood reference is had to the accompanying drawings, in which—

Figure 1 is a side elevation of the machine mounted, fixed, and adapted to be operated. Fig. 2 is a plan view of the machine. Fig. 3 is a side elevation of the cutter-head and the bit or auger, which shows the manner of mounting the same upon the frame-support. Fig. 4 is a cross-section of the cutter-head, the bit, and the frame-support therefor. Fig. 5 is a cross-section through the line X X of Fig. 2. Fig. 6 is a section through the line Y Y of Fig. 2. Fig. 7 is a detail view. Fig. 8 is a cross-section on the line Z Z of Fig. 3. Figs. 9 and 10 show details of the bit.

In the drawings, A is a revoluble cutter-

head which is provided with the cutting-tools *a a*, which may be secured to the circumferential face thereof in any suitable manner; but we prefer to bolt them to the cutter-head in the manner shown in Fig. 4, and the cutters may be arranged to alternate step by step upon the circumference of the cutter-head, being carried first on one side, then on the other, as shown in said figure, or they may be otherwise arranged, the said cutter-head being adapted to be revolved and to be moved forwardly and to cut its way into a body of coal.

B is a bit adapted to be carried in advance of the cutter-head and to be operated to cut a round hole in advance thereof. C is a plate upon which the said cutter-head is mounted, said plate being made round and preferably of the same size as the cutter-head, as shown in the drawings.

D is a raised portion or auxiliary plate made integral with plate C and extends both forwardly and rearwardly therefrom some distance and is adapted to support the shaft D', which supports and drives bit B, and upon which said shaft is fixed the bevel cog-wheel E, which is adapted to drive the cutter-head by its engagement with the cog-plate or set of cogs F on the inner face of the cutting-head, the said auxiliary plate D having a width somewhat less than the width of the bit B, the said bit being adapted to cut a clearance for the said auxiliary plate. As before stated, the auxiliary plate extends forwardly somewhat in advance of the forward edge of the cutting-head and the tools thereon and is provided with the roller *d*, journaled in the upper face thereof, and is adapted to extend above the said face a short distance for the purpose of contact with the upper face of the opening in the body of coal, the said forwardly-projecting portion of the auxiliary plate acting as a guide for the cutting-head to prevent its diverging from a straight line as it cuts into the coal, the small roller, bearing upon the surface of the channel cut by the bit, serving to reduce the friction occasioned by the draft, caused by the tendency of the cutting-head to be drawn out of straight line, to the minimum. The said auxiliary plate also extends rearwardly from the main

plate C and the cutter-head to provide a support and attaching means for the driving parts of the machine.

Referring to the manner of mounting the cutter-head, G is a plate adapted to engage the centrally-disposed projecting ring G' from the plate C and is hollowed out at its center to correspond with the opening in the ring G', which said openings combined form the oil-cup G², there being provided an inlet-opening in plate G and an opening through plate C, adapted to feed oil into the journal-bearings which support shaft D'. The plate G is secured to the plate C by means of the bolts g³ g⁴.

The plate G constitutes and forms the journal for the cutter-head A and is provided with the flange g, which is adapted to hold the said cutter-head upon the journal and bears against the outer face thereof or in a groove cut therein in the manner shown in Figs. 4 and 8 of the drawings. The shaft D' is carried in an opening through auxiliary plate D and is provided with the journal boxes or supports e e e, and the opening is enlarged somewhat, as at f, to form an oil-cup.

It will be seen from an examination of Figs. 2, 3, and 4 that the bit B as it cuts its way into the body of coal will make an opening sufficiently large to permit the auxiliary plate D to be fed forwardly therein and will also cut a narrow opening in advance of the cutter-head, so that as the said cutter-head is revolved and cuts its way into the coal it will cut into the said opening at one side of the channel that has been formed by the bit and in so doing will dislodge the pulverized or fine coal carried therein, which has resulted from the cut made by the bit, and will effectually clear the opening, so that the auxiliary plate D may advance therein.

We have shown a means for driving the cutter-head and the bit, adapting the same to be adjusted for the purpose of cutting a hole at any angle in the coal, consisting of the sleeve I, which is fixed to the plate D by means of set-screws, as shown in Fig. 4, as by unscrewing the screws the cutter-head may be turned to cut horizontally, vertically, or at any angle that may be desired. The sleeve I is adapted to be connected with a movable cross-head, as will hereinafter be explained. J is a revoluble sleeve provided with a spline running lengthwise thereon and on its inner face and is adapted to carry shaft D', which said shaft is provided with a groove which engages the spline on the revoluble sleeve. The revoluble sleeve is adapted to be secured in connection with the general supporting-frame in such a manner as to permit it to turn, but to maintain it in a stationary position so far as lengthwise movement is concerned, and is adapted to be revolved for the purpose of turning shaft D', and the shaft is adapted to be fed forward with the sleeve, the cutting-head, and other parts

adapted to be advanced, and when so advanced it slides readily in the sleeve.

Referring to Figs. 1, 2, and 5, we show the main-frame-supporting parts, and in the said figures, L L are side frame-pieces provided with channels L' in the inner faces.

L² is a cross-piece at the forward end of the frame and is made in two sections, as shown in Fig. 6, which are bolted together in the manner as therein shown.

L³ is a cross-piece at the rear of the frame.

M is a movable cross-head, with which there is connected in a fixed manner the sleeve I, which said sleeve is also supported in cross-piece L².

M' is a stationary frame-piece which connects the frame parts L L.

N is a cog-wheel carried upon the sleeve J.

N' is a collar projecting from the hub of cog-wheel N, the said cog-wheel and collar having a spline-and-groove connection with the sleeve, adapting them to slide back and forth thereon.

n is a lever pivoted, as at i, and furcated in such a manner as to engage a groove in collar N', and is provided to shift the cog-wheel in or out of engagement with cog-wheels N² N³ and may be fixed in position for such engagement by means of bolt i², which bears through a perforation in the bracket k, or it may be fixed at the point i³ for the purpose of shifting the collar and cog-wheel N.

O O' are thread-bars which are mounted in the forward cross-piece L² in the manner shown in the drawings, in which the shafts are shown reduced in size and journaled in boxes therein, and are suitably journaled near their rear ends in cross-piece M' or in suitable boxes thereon. The said thread-bars bear in a semicircular opening in the bottom of depressions or openings in the movable cross-head M and are adapted to be engaged by thread-plates or half-boxes m m', which said boxes are pivotally carried on the pivoted bar m², which said bar is adapted to be raised and lowered by means of the hand-wheel m³, provided with a grooved collar for engaging a furcated end of said pivoted bar m², the said hand-wheel being carried upon threaded bolt or pin m⁴, and by turning the said hand-wheel up or down on the threads either one threaded box or the other may be caused to engage either the threaded bar O or O', as may be desired, one of the threaded bars being adapted to move the cross-head M forward and the other to move it rearwardly.

N³ is a cog-wheel fixed upon thread-bar O, and N² is a cog-wheel fixed upon thread-bar O'. P³ is a cog-wheel fixed upon the rear end of thread-bar O. P⁴ is a cog-wheel meshing with cog-wheel P³ and mounted upon the motor-shaft in the manner shown in the drawings. The cross-head M is adapted to be fed forward or backward, as before stated, and the power to drive and turn them is de-

rived originally from the motor Q and is conveyed from the cog-wheel P⁴ to cog-wheel P³, which turns the said bar O. The said thread-bar in turning turns cog-wheel N³, which said cog-wheel, meshing with cog-wheel N, turns the same, and when cog-wheel N is in mesh with cog-wheel N³ it turns the sleeve J, upon which it is mounted, which causes the shaft D' to be turned and with it the bit D, carried on the end thereof, and will also drive cutter-head A from the bevel cog-wheel E, fixed on the said shaft, which meshes with the cog-plate on the cutter-head. The cog-wheel N when in mesh with cog-wheel N², which is mounted upon thread-bar O', will cause the thread-bar to be turned.

In applying the device for practical use when we desire to drive the machine for the purpose of cutting coal the shaft D' is driven in the manner hereinbefore described, and at the same time the cutter-head and the bit are purposed to be advanced through and by means of the connection of sleeve I with the cross-head or movable frame M, the said cross-head being purposed to be driven forwardly by thread-bar O', and to facilitate such forward feed the boxing m' is caused to bear upon thread-bar O', the threads on the box meshing with the threads on the bar, and as the thread-bar is revolved the cross-head M will be fed forward gradually as the cutting-head and bit penetrate into the body of the coal. When the cutting-tools have been fed into the body of the coal a sufficient distance or as far as the machine will permit them to be advanced, they may be returned to the starting-point by simply disengaging the boxing m' from thread-bar O' and causing the boxing m to engage thread-bar O, and as the machine is operated the cross-head M will be fed rearwardly back to the starting-point, which movement of the cross-head will cause the cutter-head and bit to be withdrawn from the opening that has been cut in the coal.

We have provided means for raising and lowering the machine and means for supporting the same.

R is a car adapted to be carried upon a track leading up to the body of coal.

S S are vertically-carried thread-bars supported one end upon the car and the other end in a frame-piece S', forming a part of a rack or frame mounted upon the cars. These thread-bars are adapted to be fixed so as to prevent their turning and may be supported in the manner shown in Fig. 7, in which figure the thread-bar is shown squared at its end and carried in a corresponding slot in the plate S², which said plate is bolted to the frame part in the manner shown in the drawings, and a key may be placed in the end of the bar, as shown in the figure.

Referring to Figs. 1, 2, and 5, T are sleeves threaded internally and mounted upon thread-bars S and are journaled in the yokes T', which said yokes are connected with the longitudinal frame-pieces L L of the machine,

this connection with the vertically-carried shafts S forming a support for the main frame of the machine.

T² T² are worm-wheels keyed upon the sleeves T in the manner shown in Fig. 5.

U is a shaft journaled upon the frame-pieces L L, and U' U² are worm-screws fixed upon said shaft and adapted to mesh with the worm-wheels T² T².

V is a shaft journaled in the frame-piece M' and supports upon one end the cog-wheel V', which meshes with the cog-wheel N³. V² is a beveled cog-wheel on the other end of the said shaft.

W is a sleeve carried upon shaft U and has an spline-and-groove connection therewith and is adapted to be moved back and forth thereon. w is a collar connected with the said sleeve, and w' w² are beveled cog-wheels secured to the sleeve, which face each other in the manner shown, and the cogs thereof are adapted to engage the beveled cog-wheel V²—that is, either the one or the other—at a given time.

W² is a lever pivoted upon cross-piece M' and adapted to engage the collar W, connected with the sleeve, and is also adapted to shift the sleeve back and forth to cause either the bevel cog-wheel w' or the cog-wheel w² to engage the bevel cog-wheel V², there being three perforations provided in the bracket k, adapted to carry a pin for the purpose of engaging a perforation in the lever to fix it in a positive position and in engagement of either the bevel cog-wheel w' or the beveled cog-wheel w² or in an intermediate position, when neither of the bevel cog-wheels will engage the bevel cog-wheel V².

When it is desired that the machine shall be raised, the cog-wheel N, having first been shifted out of engagement with cog-wheels N² and N³ and the sleeve W, is shifted to cause the proper bevel cog-wheel thereon to engage the bevel cog-wheel V², which will cause the shaft U to be turned in the proper direction, and when so turned the worm-screws U' and U², meshing with the worm-wheels T² T², fixed upon sleeves T T, cause the said sleeves to be turned, which will cause the same to travel on the thread-bars S S, which will cause the machine to be raised as desired. The object of such raising and lowering is to place the machine in proper position to make another cut in the body of coal. The machine is lowered by simply shifting the sleeve W to cause the proper bevel cog-wheel thereon to mesh with bevel cog-wheel V² to cause the shaft U to be turned in the reverse direction from that which caused the machine to be raised.

To assist in supporting the machine or the main framework thereof and for fixing it as rigidly as possible in any desired position, we have provided the cog-racks X² X² X² X² and we have provided the hinged engaging plates X³ X³ X³ X³, each of which is provided with a cog or cogs for engaging the cogs on the

cog-rack, and by means of a set-screw we are able to fix the said plates in engagement with the cog-rack in such a manner as to rigidly secure the framework of the machine at any point it may be carried by the thread-bars S, and by releasing the said plates from such engagement with the cog-rack we may then raise or lower the machine to any other desired position and may again secure it by means of the plate.

When the machine is operated, it is necessary that it shall be fixed in a positive position—that is, the framework which supports the other working parts—and we have provided for this purpose the spurs or anchors $X^4 X^4$, (shown in Fig. 1,) the said anchors consisting merely of a bar pivoted to the framework and threaded at its outer end, a hand-wheel carried on the threads of the bar, and a sleeve carried over the end of the bar and bearing against the hub of the hand-wheel and provided with a spur-point adapted to penetrate the body of the coal or wall of the entry or room in which the machine is carried, and by means of these anchors the carriage and the machine may be fixed in a positive position to provide a positive resistance for the cutter-head and bit as they cut their way into the body of coal.

In the drawings we have shown one bit suitably mounted to travel in advance of the cutter-head and an auxiliary plate adapted to support the shaft which drives the bit and to follow the bit into the opening for the purpose of guiding and anchoring the machine, providing in connection with the forwardly-extending portion of the auxiliary plate a small roller adapted to bear against the surface of the channel cut in the coal to reduce the friction attendant upon such anchoring of the machine to the minimum, as has been fully explained hereinbefore; but we do not wish to confine ourselves to a single bit and auxiliary sleeve, but we may use more than one bit—as, for instance, three of such bits suitably mounted and driven and adapted to perform the same function as the one bit, or, in other words, to cut openings in advance of the cutter-head.

Having thus fully described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a coal cutting or mining machine, the combination with a disk or plate mounted upon a vertically-movable cutter-frame, a revoluble cutter-head suitably journaled on said plate and provided with a gear mechanism suitably arranged on its inner surface, a forwardly-projecting contracted portion arranged longitudinally on said plate, a shaft journaled in said contracted portion and provided with a bit or auger carried in advance of the cutter-head and suitably mounted on said shaft, means for elevating the said cutter-head and for operating the said cutter-head and bit, and of means for adjusting the cutter-head and plate at any angle desired for

cutting, all substantially as and for the purpose described.

2. In a coal cutting or mining machine, the combination with a disk or plate provided with a forwardly and rearwardly extended contracted portion, a revoluble shaft suitably carried in said contracted portion and suitably mounted upon a vertically-movable cutter-frame, of the revoluble cutter-head suitably journaled to said plate or disk and provided with a gear mechanism suitably arranged on its inner surface, a bit or auger supported on said shaft adapted to travel and cut an opening in advance of the cutter-head, of means for supporting and conjointly actuating the said cutter-head and bit simultaneously and for adjusting the same to cut at any angle desired, all substantially as and for the purpose described.

3. In a coal cutting or mining machine, the combination with a disk or plate provided with a forwardly and rearwardly projecting contracted portion and suitably supported on a revoluble shaft and adjusted thereon, of a revoluble cutter-head journaled to said plate and provided with a gear mechanism on one of its sides, a bit or auger supported on said shaft and carried in advance of the cutter-head, a gear-wheel mounted on said shaft purposed for engaging the gear mechanism on the cutter-head, of means for elevating said cutter-head and bit and for advancing the same into the coal, all substantially as and for the purpose described.

4. In a coal cutting or mining machine, the combination with a vertically-movable frame part, of a disk or plate suitably journaled on a shaft mounted on said frame, a revoluble cutter-head provided with suitable cutting-tools and journaled upon said plate, a bit or auger suitably secured on said shaft and in advance of the cutter-head, of an expanded portion from said plate and extending in front and at the rear thereof adapted to follow the bit into the opening and acting as a support therefor, suitable set-screws at the rear of the expanded portion adapted for the purpose of setting the cutter-head to cut at any angle desired, a gearing mechanism suitably inclosed between said plate and cutter-head, consisting of the bevel-wheel on the shaft and the matching gear-teeth arranged within said cutter-head adapting the said cutter-head to be advanced into the opening cut thereby and adapted by means of said inclosure to permit the said cutter-head to be operated at any point of contact within the opening without clogging the mechanism, of means for elevating the said cutter-head and bit and for advancing the same to its work, all substantially as and for the purpose described.

5. In a coal cutting or mining machine, the combination with suitable frame parts, a plate or disk adapted to support a revoluble cutter-head, a shaft suitably carried within said frame part and suitably journaled in said plate, the disk or plate provided with an ex-

panded frame portion extending some distance in front and at the rear thereof, provided with suitable set-screws adapting the cutter-head to be adjusted on said shaft to cut into the coal at any desired angle, a bit or auger carried on said shaft in advance of the cutter-head and plate, means for simultaneously operating the said cutter-head and bit, consisting of the gear-wheel carried on said shaft and arranged within a suitable depression adapted for engaging the gearing mechanism arranged on one side of the cutter-head, of means for elevating the said cutter-head and bit and for advancing the same horizontally to its work, all substantially as and for the purpose described.

6. In a coal cutting or mining machine the combination of a revoluble cutting-head, a bit adapted to be carried and operated in advance of the cutting-head and a supporting plate and guide for the said cutting-head, provided with a supplemental plate having a width somewhat less than the width of the bit and extending forwardly in advance of the cutting-head, and provided with a small roller in the face thereof, adapted to follow the bit into the opening made thereby and to guide the cutting-head to form a straight-line opening, substantially as and for the purposes described.

7. In a coal cutting or mining machine the combination with the plate C, provided with the supplemental plate D, integral therewith and forming a raised ridge on the back thereof, of the cutting-head A provided with the cutting-tools, α , α , and with the cog-plate F, and the bit B, supported on a shaft B', which carries the beveled cog-wheel E, meshing with the cog-plate F, on the cutting-head, and means for turning shaft B' to cause the cutter-head and the bit to be turned and means for advancing the cutter-head and bit and the plate supporting them, substantially as and for the purpose described.

8. In a coal cutting or mining machine, the combination with the circular plate C, provided with the auxiliary narrow plate D, extending forwardly and rearwardly from the edge of plate C and the forwardly-extending part provided with the roller, d , of the cutter-head A suitably journaled in connection with plate C, the shaft D', journaled in the auxiliary plate D, and carrying the bit B at its forward end, the sleeve I, secured to the rearward extension of the auxiliary plate and secured to the movable cross-head M, the sleeve J having a spline-and-groove connection with shaft D', means for turning the said sleeve J for the purpose of turning shaft D', and means for moving the cross-head forwardly and rearwardly substantially as and for the purposes described.

9. In a coal cutting or mining machine, the combination with the circular plate C, provided with the auxiliary narrow plate D, extending forwardly and rearwardly from the

edge of plate C and the forwardly-extending part provided with the roller d , of the cutter-head A suitably journaled in connection with plate C, the shaft D', journaled in the auxiliary plate D, and carrying the bit B at its forward end, the sleeve I, secured to the rearward extension of the auxiliary plate and secured to the movable cross-head M, the sleeve J having a spline-and-groove connection with shaft D' the means for turning the sleeve J consisting of the cog-wheel N, having a spline-and-groove connection with said shaft and adapted to move back and forth thereon and to be thrown in and out of mesh with a driving cog-wheel suitably connected with the power, substantially as and for the purposes described.

10. In a coal cutting or mining machine, the combination with the circular plate C, provided with the auxiliary narrow plate D extending forwardly and rearwardly from the edge of plate C and the forwardly-extending part provided with the roller d , of the cutter-head A suitably journaled in connection with plate C, the shaft D', journaled in the auxiliary plate D, and carrying the bit B at its forward end, the sleeve I, secured to the rearward extension of the auxiliary plate secured to the movable cross-head M, the sleeve J having a spline-and-groove connection with shaft D' the means for feeding the cross-head M forwardly and rearwardly consisting of the thread-bars O, O', the cog-wheels N² and N³ meshing with cog-wheel N, and suitably connected with the driving power to operate them conjointly, the threaded boxes, m and m' , carried upon the pivoted arm m^2 , and adapted one of them at a time to engage the thread-bars or one of them, so that by such engagement the said cross-head may be fed forwardly and by the other engagement it may be fed rearwardly and means for turning sleeve J for the purpose of operating the cutter-head and the bit substantially as and for the purpose described.

11. In a coal cutting and mining machine, the combination, with a revoluble cutting-head and a bit suitably supported and driven and suitably carried in connection with the driving mechanism adapting same to cut an opening into the coal at any angle desired, a framework for supporting the driving mechanism, of a means for raising and lowering the framework L, consisting of the thread-bars S, S, fixed in a suitable frame-support, the threaded sleeves T, carried upon the thread-bars and journaled in the yokes T', T', connected with frame L, and having secured thereto the worm-wheels T², T², the worm-screws U', U², meshing therewith and carried upon shaft U, the adjustable sleeve W, provided with gear-wheels w' , w^2 , and with the collar w , the bevel cog-wheel V², adapted to mesh with bevel cog-wheel w' , or bevel cog-wheel w^2 , or to be disengaged from both, means for shifting said sleeve to cause said

engagement and means for driving bevel cog-wheel V^2 , substantially as and for the purpose described.

12. In a coal cutting and mining machine, the combination with a revoluble cutting-head and a bit suitably supported and driven and with a framework for supporting the driving mechanism, of a means for raising and lowering the framework L consisting of the thread-bars S, S, fixed in a suitable frame-support, the threaded sleeves T, carried upon the thread-bars and journaled in the yokes T' , T' , connected with the frame L, and having secured thereto the worm-wheels T^2 , T^2 , the worm-screws U' , U^2 , meshing therewith and carried upon shaft U, the adjustable sleeve W, the bevel cog-wheel V^2 , adapted to mesh with bevel cog-wheel w' or bevel cog-wheel w^2 , or to be disengaged from both, means for shifting said sleeve to cause said engagement and means for driving bevel cog-wheel V^2 , means for fixing and assisting in maintaining the framework in a desired position consisting of the cog-racks X^2 , and the hinged plates X^3 , secured to frame L and provided with a cog or cogs adapted to engage the cogs of the cog-racks and provided with a set-screw for securing them in position, substantially as and for the purpose described.

13. In a coal cutting and mining machine, the combination with the plate C and with the auxiliary plate D, the plate C provided with the outwardly-projecting ring G' , and the detachable plate G, of the cutting-head A, provided with cutting-tools a , suitably secured thereto, and with the cog-plate F, set into the body of the cutter-head, the shaft D' suitably journaled in the auxiliary plate and carrying the bit B and having the beveled cog-wheel E, fixed thereon and adapted to mesh with cog-plate F, means for turning the said shaft and means for moving the cutter-head the bit and the supporting-plates forwardly and rearwardly substantially as and for the purpose described.

14. In a coal cutting and mining machine, the combination with a revoluble cutter-head suitably connected with movable frame parts adapting the same to be adjusted to cut at any angle desired, of a plate adapted to support the said head provided with the forwardly-extended contracted portion, a shaft journaled in said plate provided with a gear-wheel for engaging gear mechanism on the cutter-head and a bit carried on the end of the shaft in advance of the forwardly-projecting portion of the plate and in advance of the cutting-head, such carrying of the gearing mechanism or operating parts, adapting the cutter-head and plate to be advanced within the opening cut thereby and to be operated at any point of contact with the coal when the same is advanced therein by means of the gearing being housed substantially as shown.

15. In a coal cutting or mining machine, the combination with a plate adapted to sup-

port a cutting-head, and a shaft carrying a bit in advance of the cutting-head, of a forwardly-extending projection from said plate, adapted to follow the bit into the opening cut thereby in advance of the cutter-head and provided with a small roller on its surface purposed to contact with the wall of the opening, substantially as and for the purpose described.

16. In a coal cutting or mining machine, the combination of a revoluble cutter-head suitably mounted upon a vertically-movable frame part, a bit carried in advance of the cutter-head, a shaft supporting said bit provided with a gear-wheel matching with a gear mechanism on the cutter-head, a plate supporting the said cutter-head and provided with a forwardly and rearwardly projecting contracted part adapted to follow the bit into the opening cut thereby and in advance of the cutter-head and at the rear of the bit, of means provided at the rear of the contracted portion of the plate for adjusting the cutter-head and plate adapting the same to cut at any angle desired, means for operating the cutter-head and bit simultaneously and for feeding them forwardly at the same time, all substantially as and for the purpose described.

17. In a coal cutting or mining machine, the combination with a circular plate having a depending portion on which is mounted a revoluble cutter-head, and a shaft carrying a bit, in advance of the cutting-head, of a longitudinal frame across the axis of said cutter-head and integral with said plate, and projecting some distance in front and at the rear of said plate and cutter-head, and adapted to follow the bit into the opening cut thereby, means for raising or lowering the said operating parts and for adjusting the cutter-head and plate at any angle desired for cutting, and means for operating and advancing the said bit and cutter-head to their work, all substantially as and for the purpose described.

18. In a coal cutting or mining machine, a revoluble cutting-head mounted on a vertically-movable cutter-frame and adapted to cut at any angle desired, suitable gear mechanism carried on one of its sides, of a shaft adapted to bear between said plate and cutter-head provided with a gear-wheel for engaging the gear mechanism on the cutter-head, of a bit carried on the forward end of said shaft adapted to bear in front of said plate and cutter-head and to travel in advance thereof, and a forwardly-extending contracted part secured to said plate adapted to follow the bit into the opening cut thereby in advance of the cutting-head and to form a guide for the cutting-head, all substantially as and for the purpose described.

19. In a coal cutting or mining machine, the combination with the plate C, having the centrally-disposed projecting ring G' , the revoluble cutter-head A, having suitable cutting-tools arranged around its periphery, the

plate G, adapted to match with and to be secured to the ring G', and provided with the flange g, adapted to hold the cutter-head A, upon the journal, a shaft suitably supported 5 in the plate C, and provided with a bit or auger carried in advance of the plate and cutter-head and suitably mounted on said shaft, also provided with a beveled gear-wheel adapted to mesh with a gear-wheel on the rev- 10 oluble disk, all substantially as and for the purpose described.

20. In a coal cutting or mining machine, the combination with a revoluble cutter-head suitably mounted upon a disk or plate, of a 15 rotatable shaft journaled in said plate and suitably mounted to be actuated on a vertically-movable frame part, a bit or auger carried on said shaft in advance of the cutter-head and plate and rotatable therewith, an 20 expanded portion integral with said plate and arranged longitudinally with said shaft and

adapted to follow the said bit or auger into the opening cut thereby and for steadying the same when at work, a gearing mechanism suitably arranged between said shaft and 25 cutter-head adapting the cutter-head and bit to be actuated simultaneously, of means for elevating said operating parts, and for advancing the same into the coal, and of means for adjusting said cutter-head and plate upon 30 the shaft adapting the same to advance into the coal at any angle desired for cutting, all substantially as and for the purpose described.

In testimony whereof we affix our signatures in presence of two witnesses. 35

ISAAC WANTLING.
JAMES T. JOHNSON.

Witnesses:

W. V. TEFFT,
CHAS. W. LA PORTE.