(No Model.) 3 Sheets—Sheet 1.

L. B & C. W. ATKINSON.

ELECTRICALLY DRIVEN MACHINERY FOR CUTTING COAL.

No. 481,775. Patented Aug. 30, 1892.

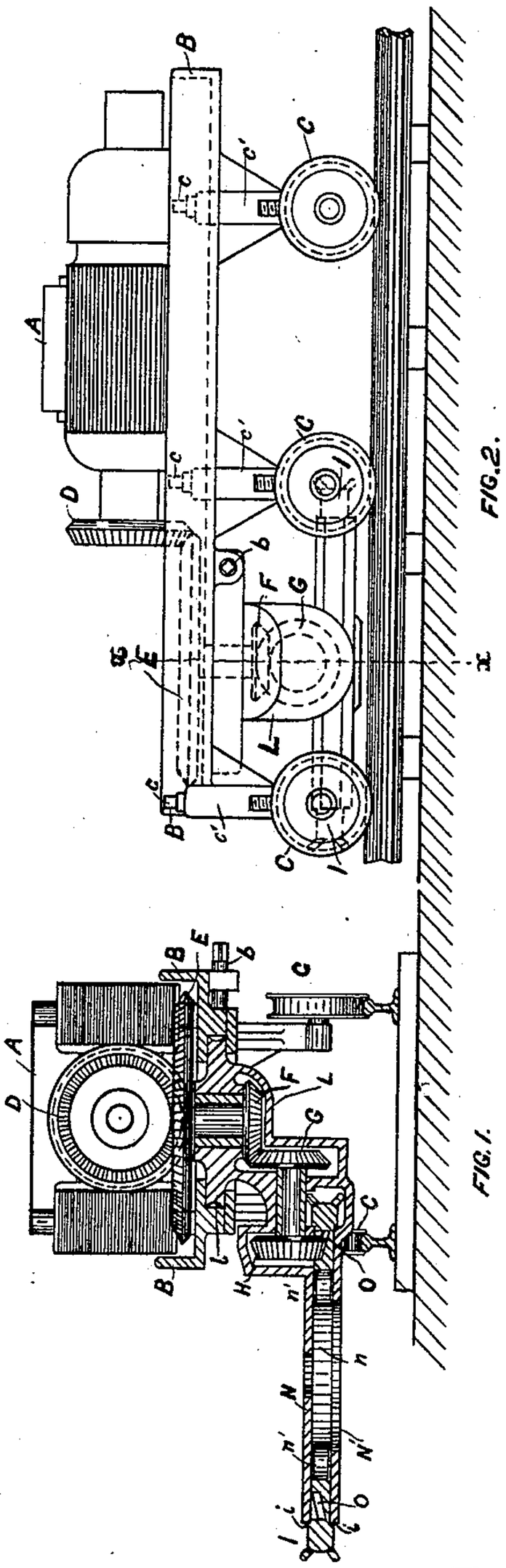

FIG. 2.

FIG. 1.

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(No Model.) 3 Sheets—Sheet 2.

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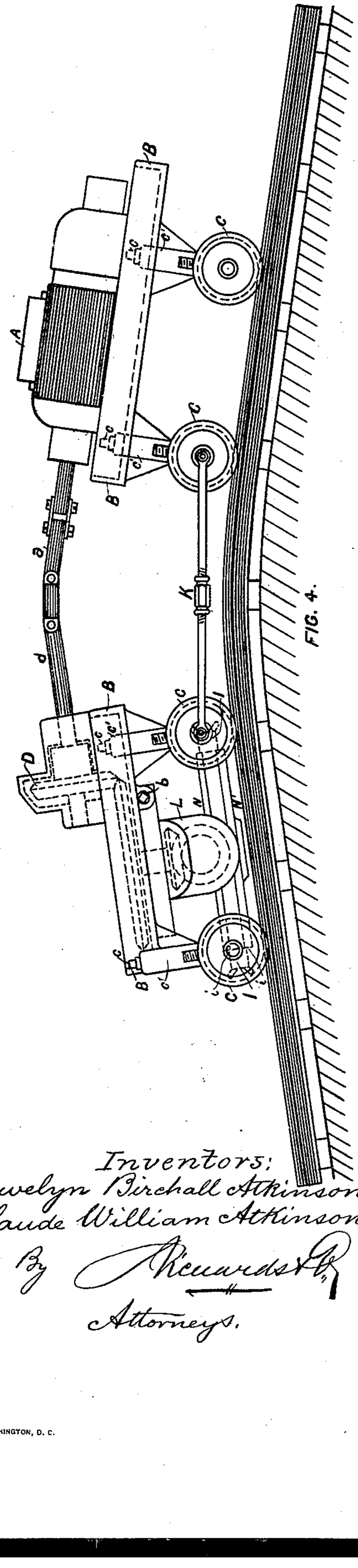

FIG. 4.

FIG. 3.

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(No Model.) 3 Sheets—Sheet 3.

L. B & C. W. ATKINSON.

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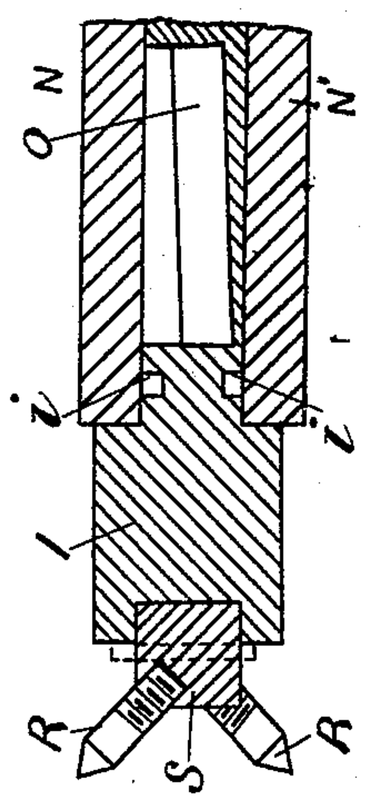

FIG. 5.

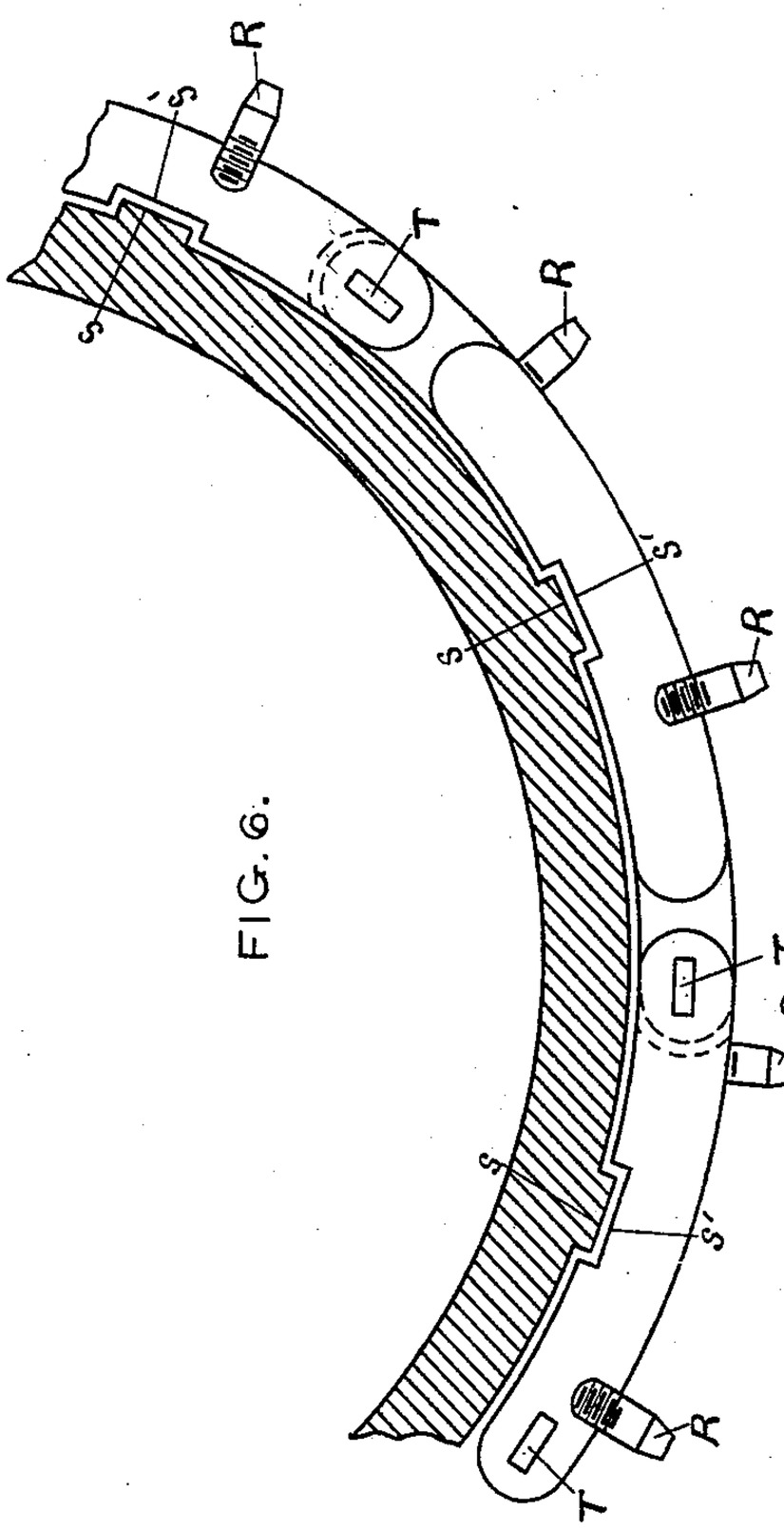

FIG. 6.

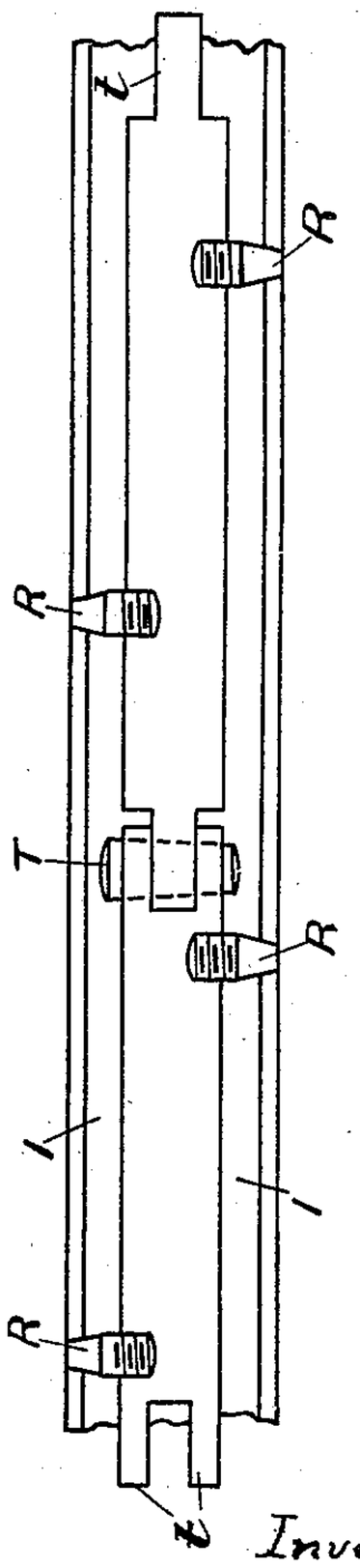

FIG. 7.

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UNITED STATES PATENT OFFICE.

LLEWELYN B. ATKINSON AND CLAUDE WILLIAM ATKINSON, OF LONDON, ENGLAND.

ELECTRICALLY-DRIVEN MACHINERY FOR CUTTING COAL.

SPECIFICATION forming part of Letters Patent No. 481,775, dated August 30, 1892.

Application filed August 18, 1891. Serial No. 403,019. (No model.)

To all whom it may concern:

Be it known that we, LLEWELYN BIRCHALL ATKINSON and CLAUDE WILLIAM ATKINSON, residing at London, England, have invented Improvements in Electrically-Driven Machinery for Cutting Coal, of which the following is a specification.

Our invention relates to machinery for cutting coal or other mineral, driven by electricity, and especially to that class in which a disk cutter is employed.

Our invention consists in the relative arrangement of the cutting mechanism, to the motor which drives it, and in the driving connecting-gear, and, secondly, in an improved construction of disk cutter, whereby greater efficiency may be attained by the provision of means for maintaining the gear driving the said cutter in a properly-lubricated condition; also, by preventing the clogging of the said gearing by any dirt, coal, or other matter which would tend to interfere with the working of the same.

In order that our invention may be the better understood, we will now proceed to describe it in relation to the drawings hereunto annexed, reference being had to the letters marked thereon.

Like letters refer to like parts in the various figures.

Figure 1 is an end sectional elevation of our machine, the section being on the line *x x* of Fig. 2. Fig. 2 is a side elevation. Fig. 3 is a plan. Fig. 4 is a view showing the cutting-machine and dynamo flexibly connected to one another. Fig. 5 is a detail of the tool-carrying ring. Fig. 6 is a plan of the same. Fig. 7 is a side view showing the method of attachment of the segments of the tool-carrying ring to one another.

We carry out our invention as follows: The electromotor A for driving the cutter is mounted upon a framework B, carried upon wheels C, which are adapted to be regulated in relation to the framework B by means of screws *c*, having square heads, so as to be turned by a handle or spanner. The screws engage with nuts situated within the wheel-brackets *c'*, each nut carrying an axle upon which a wheel C is supported. It is obvious that by this means the machine can be raised or lowered in relation to the ground, as may be desired. The field-magnets of the dynamo A form part of the framework B.

Upon the dynamo-shaft a bevel-cogged wheel D is fixed and gears with a large wheel E, which through wheels F G H drives the ring I, which carries the tools. The whole of the gearing from the dynamo is mounted upon an arm or bracket L, adapted to rotate about the axis of the wheel E to permit the cutter being turned into or out from the face of the coal. This is effected by means of a shaft *b*, carried in bearings on the framework B, having a thread or worm *b'*, which gears with suitable teeth arranged around the turn-table *l*, which is supported on the framework B and carries the arm L. The gearing from the dynamo to the cutter is so proportioned as to give a sufficiently slow peripheral speed of the latter in relation to the high speed of the former. The gearing employed may be either of the ordinary straight, bevel, or helical type.

In cases where it is necessary or expedient to reduce the weights of individual parts of machinery we find it advisable to divide the framework B and mount the motor or dynamo on one part and the coal-cutting mechanism on the other. In Fig. 4 we show the machine thus arranged. The shaft of the motor A is connected by a flexible connection *a*, formed of one or more universal or Hooke's joints, to the shaft *d* of the cutting-machine. The shaft *d* is adapted to freely slide within the boss of the wheel D, and is provided with a feather-way into which a feather on the wheel D engages and through which the driving effect is produced. An adjustable coupling-rod K is arranged on each side of the machine, attached to an axle on each divided part of the machine, by which the distance between the two parts may be adjusted as desired. It is obvious that by these means any unevenness of the ground which may prevent the perfect alignment of the machines one to the other will not in any way interfere with the smooth and efficient working of the machine.

Another feature of this relative arrangement of the motor to the cutter is that the

wheel-base of the cutting-machine may be very short and thus follow more accurately the inequalities of the floor.

We will now describe our improved form of cutting device.

Instead of mounting the disk or ring I upon a central shaft, we form it as an annulus having recessed shoulders *i* upon the internal periphery and on each face. These said recesses fit over the bearing-plates N N′, which form a journal upon which the ring revolves. These bearing-plates, which are rigidly attached to or form part of the arm L, are maintained and supported at the proper distance apart by a central piece *n*, which is preferably formed integral with the plate N and is of such a size and nature that should a large body of coal fall upon it when under the face it will resist flexure and thus prevent the cutting-disk being jammed in its bearing. It is also obvious that the amount of rotating surface exposed to the weight of superincumbent material is much reduced in comparison to a complete disk, only the projecting surfaces of the ring I being exposed to friction, which latter is much reduced, as the weight of the material is taken mainly by the bearing-plates N N′. Antifriction-rollers *n′* may be provided between the ring I and the periphery of the distance-piece *n* to further reduce the journal-friction. Around that part of the ring I situated between the bearing-plates N N′ we arrange teeth O, which gear with the wheel H and are driven thereby. By this arrangement the gearing is entirely inclosed and the rubbing-surfaces are kept continually lubricated by grease or other lubricant situated in the spaces between the gearing and the ring I and the framework in which it works. The surfaces may be provided with a groove or grooves to better retain the lubricant, as shown in Fig. 5 at *i′*. The cutting-tools R may be carried direct by the ring I, or preferably by a ring S, divided into two or more segments and supported on and driven by the ring I.

In Fig. 5 we show the ring I with a groove and the ring S lying therein, projections *s* and recesses *s′* being arranged on the former and latter, respectively, through which the driving of the ring S is effected, as shown in Fig. 6. The segments of the ring S are connected together by cotters T, engaging with lugs or ears *t* on the segments, which are interposed between one another, as shown in Fig. 7. A great advantage of this arrangement is that when the cutters are worn out or blunt the machine can be stopped and the ring S, with its cutters, removed, being replaced by another segmental ring with sharp cutters, thus considerably reducing the time entailed in equipping the machine with a fresh set of cutting-tools.

Having now described our invention, what we claim is—

1. A machine for cutting coal or other mineral, consisting of an electrical motor mounted upon a traveling carriage B, provided with track-wheels and adjustable as to height thereon by vertical bearing-screws C C′, a driving-shaft *d*, bevel-gears D E F G H O, and an annular ring carrying cutting-tools operated by said gears and adapted to revolve on and protected by fixed bearing-plates N N′, forming part of the gearing-framing L and adapted to swivel on the traveling carriage by worm and worm-wheel *b l* round the axis of second vertical driving-shaft, substantially as described.

2. In a machine for cutting coal or other minerals, a revolving ring or annulus carrying the cutting-tools and provided with bevel-geared teeth, in combination with two rigid bearing-plates covering the said bevel-teeth and between which the said tool-ring provided with lubricating-channels is journaled, substantially as described.

3. In a machine for cutting coal or other minerals, a series of curved segments S′, detachably attached to one another by cotters T, carrying the cutting-tools R, and adapted to engage by recesses *s′* upon projections *s* of a revolving ring I and to be drawn tightly upon the said ring by the cotters T, substantially as described.

4. In a machine for cutting coal or other minerals, an electromotor mounted on a traveling carriage adjustable for height and level upon its track-wheels, in combination with a cutting-machine provided with a protected disk cutter on a divided and similar traveling carriage, also adjustable as to level upon its track-wheels, and a connection between the wheel-axles of the carriage, adjustable connecting-rods enabling joint movement on the track and a connection between the motor and cutting apparatus, and a sliding universal jointed shaft to communicate rotary motion whatever the irregularities of the track or movement of the apparatus, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

LLEWELYN B. ATKINSON.
CLAUDE WILLIAM ATKINSON.

Witnesses:
FRED CHEESWRIGHT,
RICHARD A. HOFFMANN.