(No Model.) 3 Sheets—Sheet 1.

I. E. STOREY.

ELECTRIC COAL CUTTER.

No. 555,832. Patented Mar. 3, 1896.

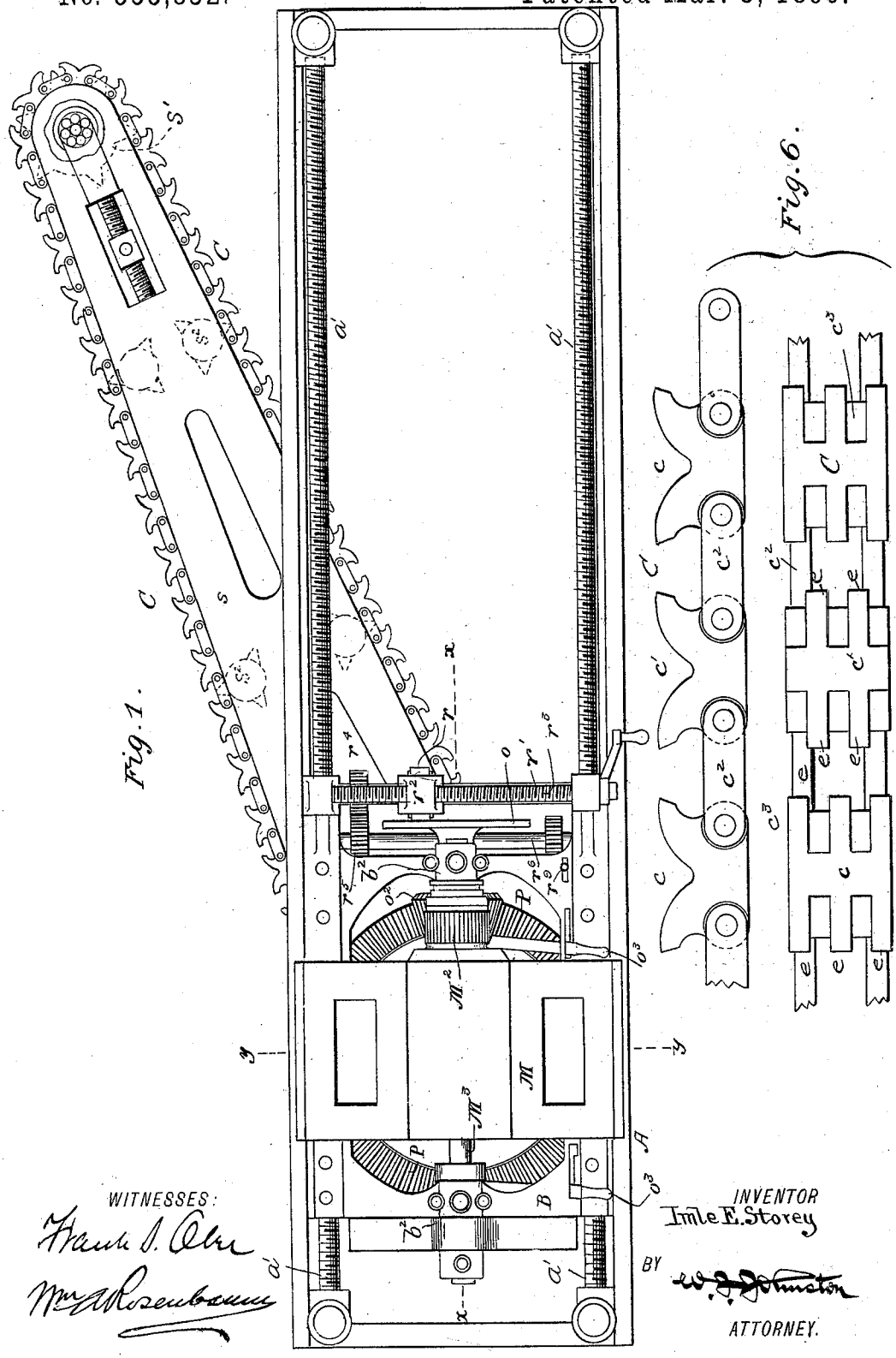

Fig. 1.

Fig. 2.

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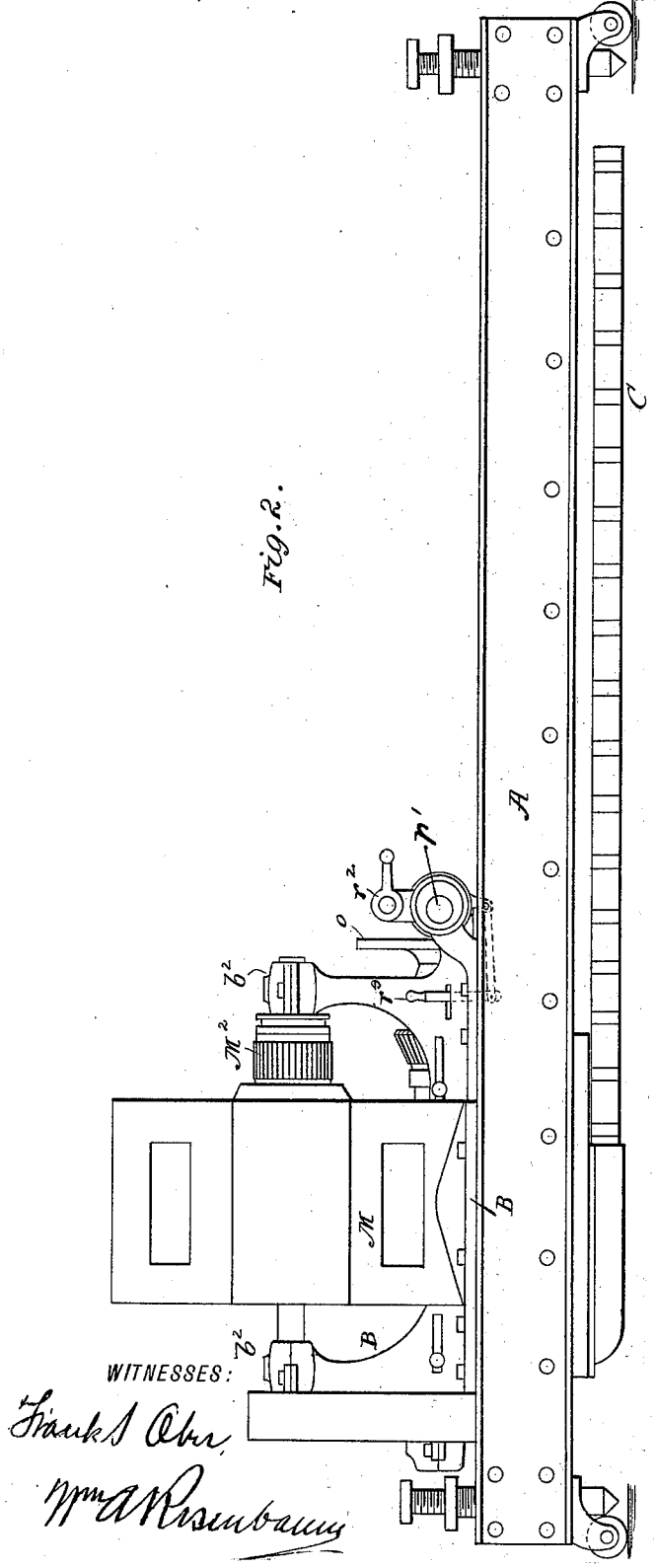

Fig. 2.

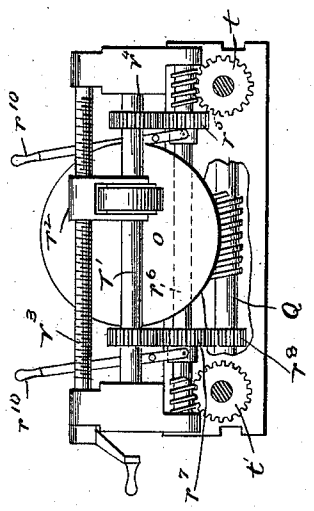

Fig. 5.

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Fig. 4.

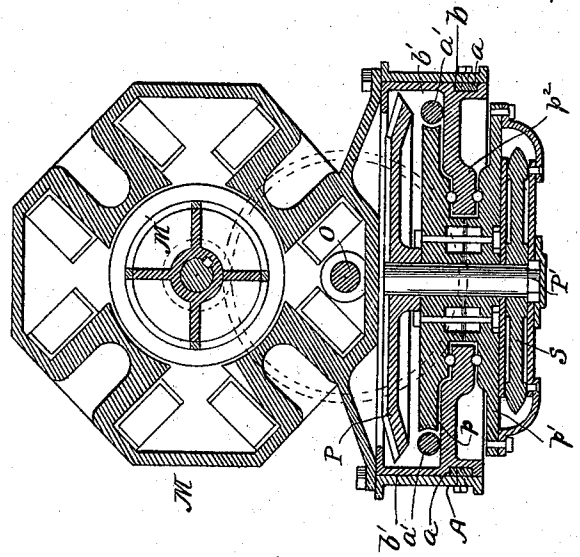
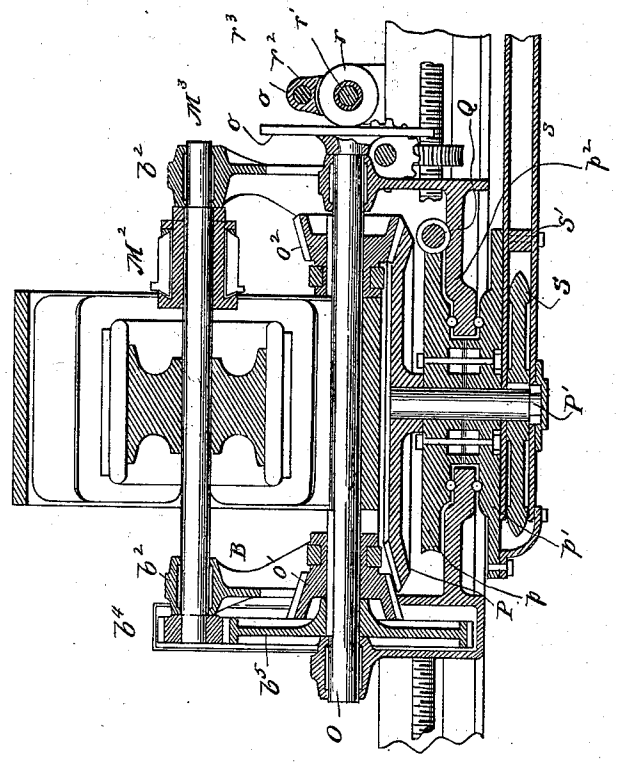


Fig. 5.



WITNESSES:

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UNITED STATES PATENT OFFICE.

IMLE E. STOREY, OF BOULDER, COLORADO, ASSIGNOR TO THE STOREY ELECTRIC DRILL AND POWER COMPANY, OF COLORADO.

ELECTRIC COAL-CUTTER.

SPECIFICATION forming part of Letters Patent No. 555,832, dated March 3, 1896.

Application filed December 20, 1890. Serial No. 375,290. (No model.)

To all whom it may concern:

Be it known that I, IMLE E. STOREY, a citizen of the United States, residing in Boulder, county of Boulder, State of Colorado, have invented certain new and useful Improvements in Electrical Coal-Cutting Machines, of which the following is a specification.

This invention relates to coal-cutters which are used in coal-mines for cutting out coal.

The objects of this invention are to provide a coal-cutter which shall be operated by electricity and which shall be compact in construction and simple in operation.

It is also the object to provide a cutter which will cut coal on either side of the machine and which will work speedily and make a narrow kerf.

The invention also has other objects which will be brought out in the following description.

Referring to the drawings, Figure 1 represents a plan of the machine; Fig. 2, a side elevation; Fig. 3, a section on line $x\,x$ of Fig. 1; Fig. 4, a section on line $y\,y$ of Fig. 1; Fig. 5, an end elevation of the feeding mechanism, and Fig. 6 two views of the cutting-chain.

A represents the main frame of the machine. It consists of a rectangular frame of iron, having two long sides and short end pieces. On the inside of the side pieces tracks a are formed or secured, upon which the motor and cutter-frame slide.

a' represents two threaded rods located just above and adjacent to the tracks on each side of the frame, running throughout its length and mounted fixedly in the ends or corners of the frame.

B represents the motor and cutter-frame. It is provided with grooves b, which fit over the tracks a. The frame has side pieces, b', in which the said grooves are formed, which stand parallel with the side pieces of the frame A.

The frame B supports an electric motor consisting of a four-pole field-magnet M, an armature M′ and a commutator M^2, the shaft of which is represented by M^3. The shaft has its bearings in the pillow-block b^2. One end of the shaft projects through its bearing and carries a pinion b^4, which engages with a gear b^5, fast upon a counter-shaft O, having its bearings suitably located in the frame B. This counter-shaft extends through and between the field-magnet coils of the motor and carries on its extreme end a friction-disk o. Near each end of this shaft and mounted upon it by means of a feather are two bevel-pinions o' o^2, which are provided with forks and levers o^3 for the purpose of sliding them along the shaft O. These pinions are adapted to engage one at a time with a large horizontal bevel-wheel P, secured tightly upon a short vertical shaft P′ and having its bearings in the hub of the structure $p\,p'$. The lower end of the shaft P′ is below the bottom of the frame A and carries at its lower end a large sprocket-wheel S, which is housed between two long steel plates $s\,s$, constituting the cutter-arm. These plates are separated and braced by blocks s' for the purpose of lightness and strength.

The end of the cutter-arm through which the shaft P′ projects is the pivotal end, and it is supported by the two disks $p\,p'$, bolted together, as shown. The disk p' is bolted to the cutter-arm, and the disk p is a worm-gear engaging with a worm on shaft Q. The disks are provided with ball-bearings located on the opposite sides of an annular horizontal flange p^2, forming part of the frame B. The cutter-arm is nearly as long as the frame A. It is tapering, being narrower at its outer or free end. The cutting-chain C passes around the sprocket-wheel S at the pivotal end and around the smaller sprocket-wheel S′ at the outer end of the arm. It is supported by idlers S^2. The wheel S′ is mounted in an adjustable box for the purpose of taking up stretch or slack of the chain. From the description of the apparatus so far it will be seen that the chain is driven by the motor through the pinion b^4, wheel b^5, shaft O, pinion o' or o^2, gear P, shaft P′ and wheel S.

I will now describe the mechanism for automatically swinging the cutter-arm either to one side or the other of the frame A and for simultaneously moving or feeding the frame B, with what it carries, along the frame A.

r represents a friction-pinion engaging with the surface of the friction-disk o on the end of the shaft O. This pinion is adapted to slide on a lateral shaft r' mounted in eccen-

tric bearings, which will be described. This pinion is also connected with a threaded nut r^2, through which passes a threaded shaft r^3 parallel to the shaft r' and fitted with a crank at its end for the use of an operator. By turning this crank the friction-pinion is moved a greater or lesser distance either side of the center of disk o, thereby determining its speed and direction of rotation. The shaft r' carries the pinion r^4, meshing with pinion r^5, feathered on the shaft r^6. Shaft r^6 also carries idler r^7, which meshes with pinion r^8 on the worm-shaft Q. The idler r^7 and pinion r^5 may be thrown out of gear by means of levers r^{10}. Shaft r^6 is provided at its extremity with worms which mesh respectively with pinions t t', surrounding and working upon the threaded rods a' a' before mentioned. The bearing-surfaces of these pinions are threaded to fit the thread on said rods. These pinions t t' are mounted in the frame B, and when they are rotated the said frame is carried or moved along the frame A on the tracks a. The shaft r' is mounted in eccentric bearings, as shown in Fig. 2, and is adapted to be thrown toward or away from the disk o by means of lever r^9 for the purpose of varying the pressure of the friction-pinion upon the face of the friction-disk, thereby determining at what amount of load the two surfaces will slip.

As before described, the worm-shaft Q meshes with the gear p and turns or swings the cutter-arm on its ball-bearing pivot. The swinging of the cutter-arm and the feeding or movement of the frame B along frame A are therefore accomplished directly through the friction-gear, the power being imparted to both through the same.

The cutter-arm swings perfectly free in a horizontal plane beneath the frame A, and, as will be observed, its point of support may be anywhere along the length of the frame A. It is therefore possible to cut a square kerf with this machine.

The cutting-chain C is made up of cutting-teeth c c' connected together by links c^2. The links are of peculiar construction. They are adapted to cut when the chain is moving in either direction—that is to say, each tooth has two cutting-edges. The cutting-edges, instead of being straight and continuous, are interrupted by openings or slots c^3 which form in fact a plurality of cutting-edges e e e. Each alternate tooth has three of these cutting-edges, while the others have two of them, and the cutting-edges of the teeth are opposite the spaces between the cutting-edges of the next adjacent teeth, so that although each tooth does not cut the full width of the kerf what is left by one tooth is removed by the next one. This form of tooth does much more satisfactory work than the continuous-edged tooth, for the reason that the latter scrapes or gouges a comparatively large surface, while the former disintegrates or tears. The chattering or vibrating of the straight-edged tooth is also overcome by this improved tooth.

In operation the machine is set up close to the wall or breast of coal and the motor started. By throwing in one or the other of the bevel-pinions o' o^2 in accordance with the direction which it is desired the chain shall run the chain is started. Next the lever r^9 is operated to throw the friction-pinion against o. This operates both feeding movements of the cutter-arm which act together and automatically. The arm is therefore swung into the coal and its supporting-frame carried from one end to the other of the frame of the machine, thus cutting a hole or kerf in the coal, having one of its boundaries at substantially right angles to the breast or wall. The arm is then standing at right angles to the machine. The friction-pinion is then thrown to the other side of the center of the disk o in the manner hereinbefore described, and the shaft Q thrown out of connection with the shaft r^6 by sliding the idler r^7 to one side. Then the frame B will reverse its motion and move back to the other end of frame A and carry the cutter-arm with it, maintaining the same at right angles to the machine. The arm may then be withdrawn from the kerf by throwing in shaft Q and throwing out the pinions t t' by moving r^5. The machine has then cut a complete square kerf in the coal. It is obvious that the arm may perform the same movements on either side of the machine and that the several feeds may be operated simultaneously or separately, as desired.

Having thus described my invention, I claim—

In a coal-cutter, the combination with a motor and its shaft, of a counter-shaft passing between the field-magnet coils, bevel-pinions carried by the counter-shaft, a bevel-gear with which said pinions are adapted to engage, a cutting-chain driven by said gear and a feeding mechanism driven by said counter-shaft whereby a compact and symmetrical machine is provided.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

IMLE E. STOREY.

Witnesses:
EDWARD A. WAGNER,
TERESA E. LYNCH.