(No Model.) 3 Sheets—Sheet 1.

C. J. VAN DEPOELE.

ELECTRIC COAL MINING MACHINE.

No. 458,868. Patented Sept. 1, 1891.

Fig. 2.

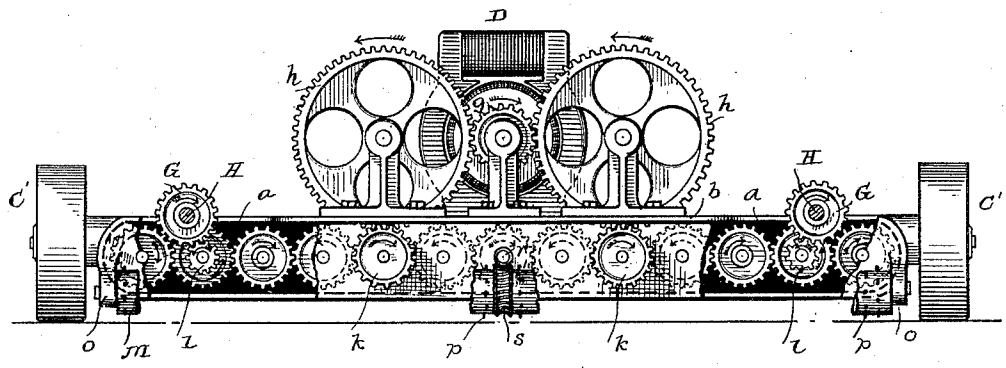
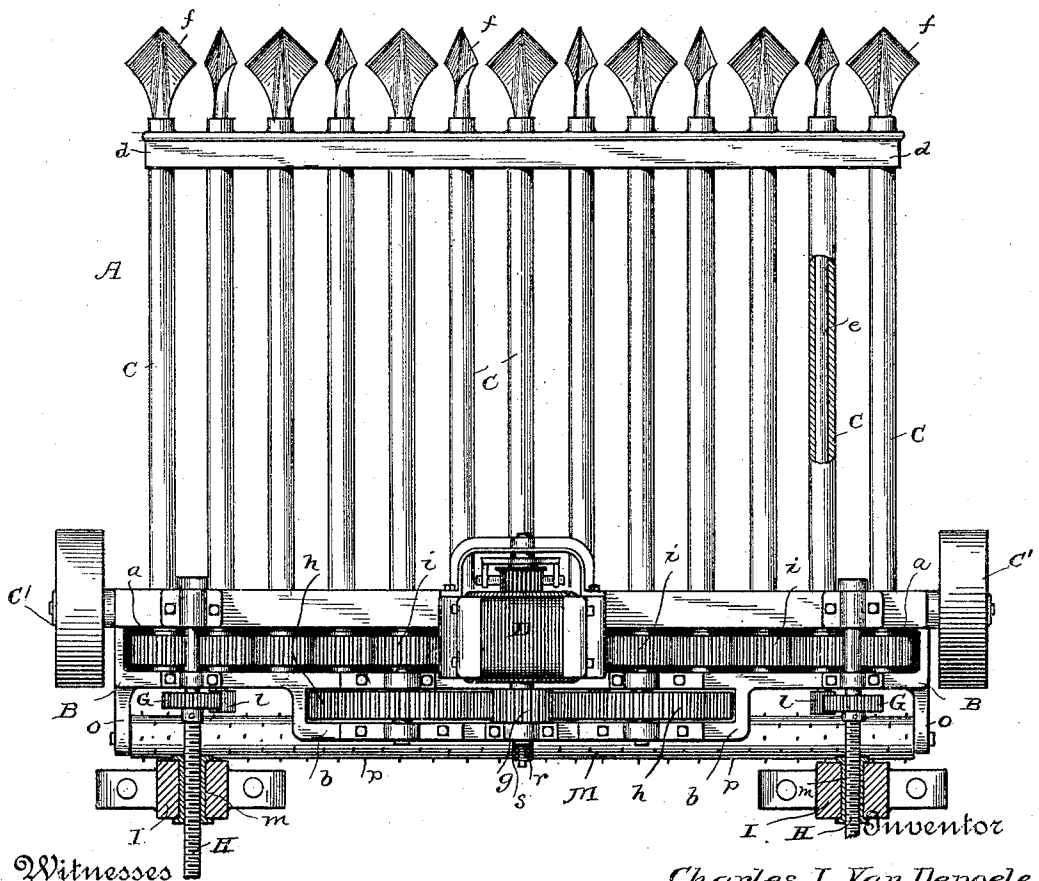


Fig. 1.



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(No Model.)

3 Sheets—Sheet 2.

C. J. VAN DEPOELE.

ELECTRIC COAL MINING MACHINE.

No. 458,868. Patented Sept. 1, 1891.

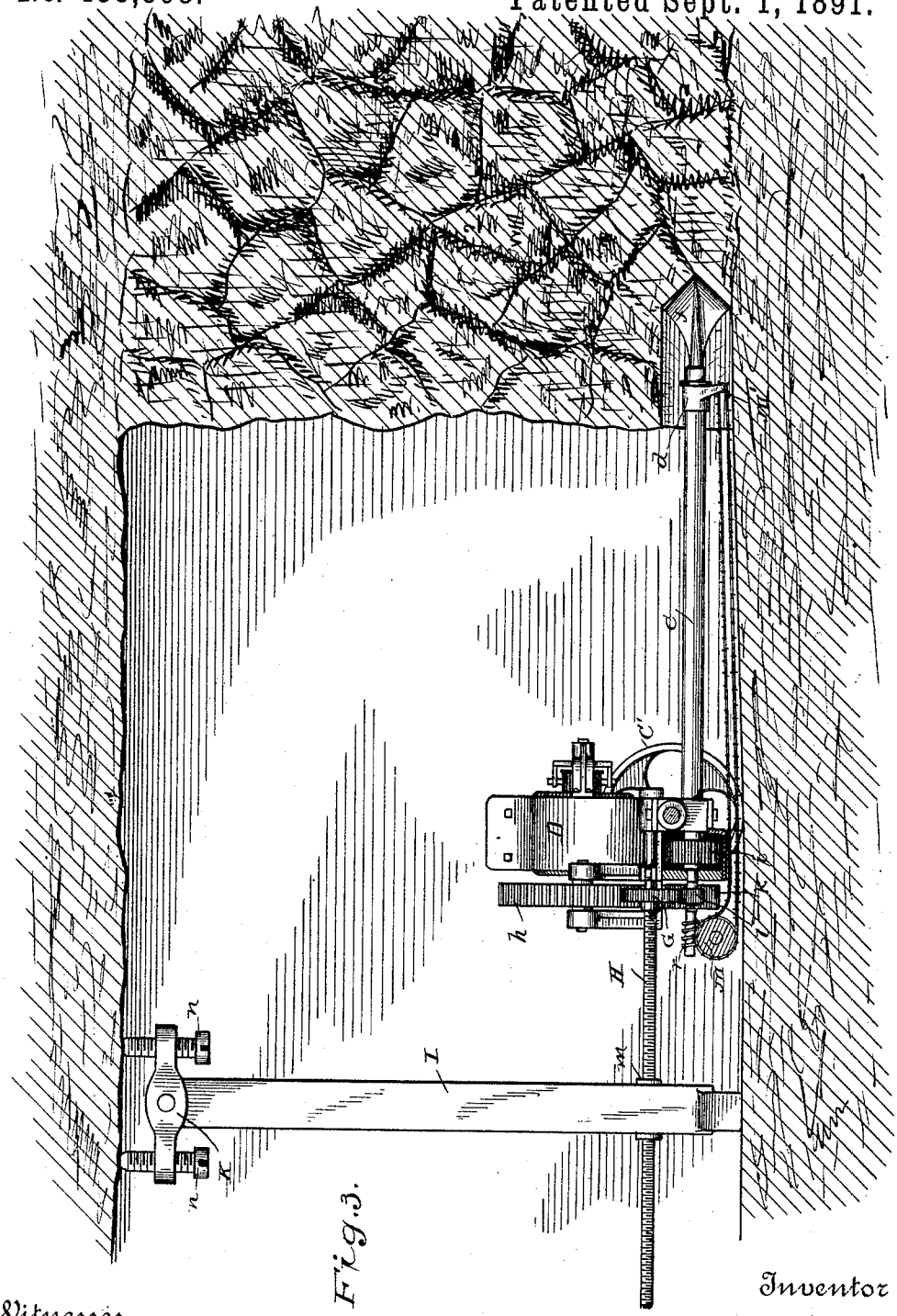

Fig. 3.

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(No Model.) 3 Sheets—Sheet 3.

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ELECTRIC COAL MINING MACHINE.

No. 458,868. Patented Sept. 1, 1891.

Fig. 4.

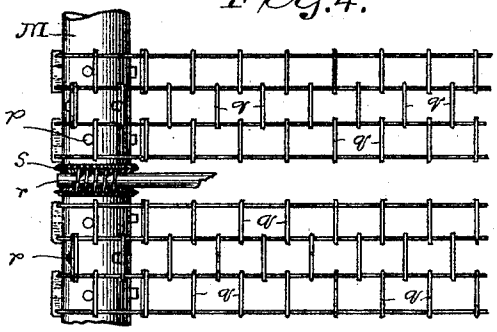


Fig. 5.

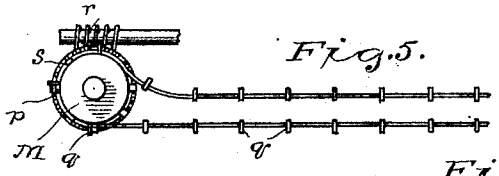


Fig. 7.

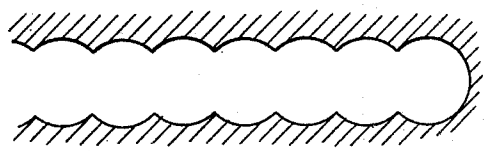


Fig 6

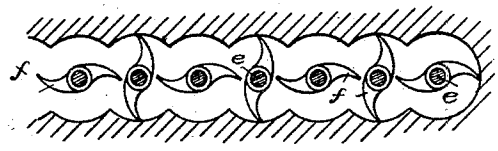
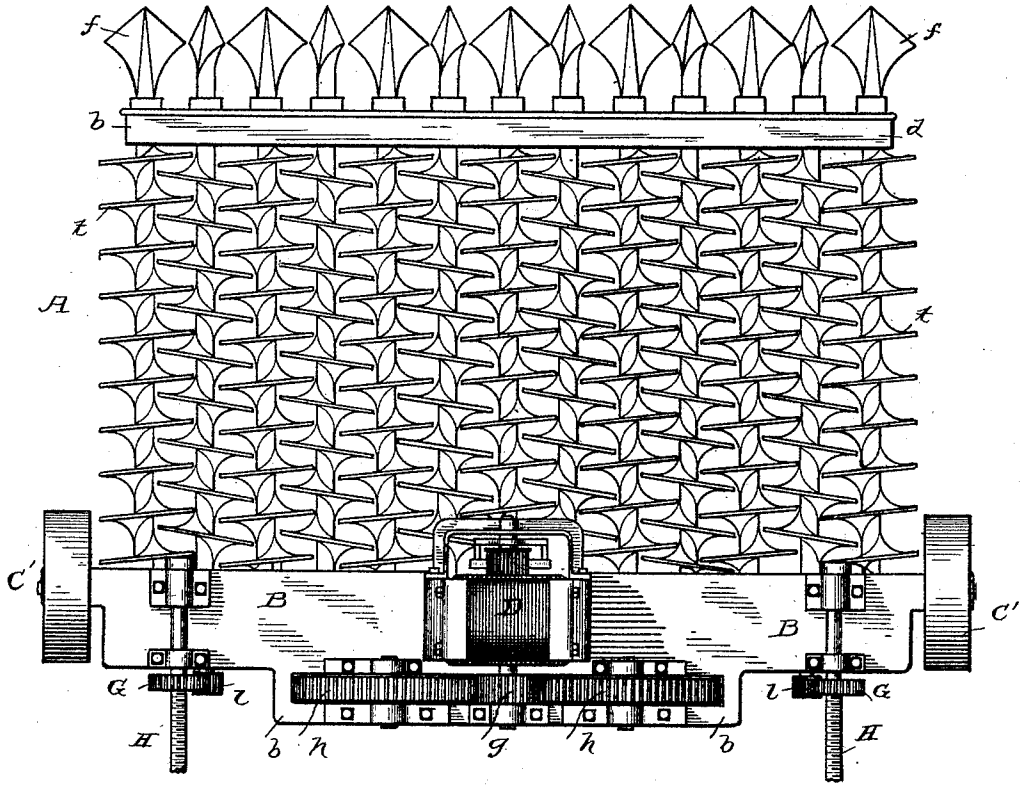


Fig. 8.



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UNITED STATES PATENT OFFICE.

CHARLES J. VAN DEPOELE, OF LYNN, MASSACHUSETTS.

ELECTRIC COAL-MINING MACHINE.

SPECIFICATION forming part of Letters Patent No. 458,868, dated September 1, 1891.

Application filed October 3, 1890. Serial No. 366,970. (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. VAN DEPOELE, a citizen of the United States, residing at Lynn, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Electric Coal-Mining Machines, of which the following is a description, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention relates to improvements in coal-mining machines in which a series of augers are employed to perform the work of under cutting.

The object of the invention is to provide an apparatus in which many of the cumbersome supporting parts of machines now in use are eliminated, making the machine smaller and lighter and more capable of successful operation in limited spaces.

Further objects are to simplify the mechanism for feeding forward the drills automatically and to remove the disintegrated material, all the operations being carried on in unison.

While I have shown the necessary power for operating the machine as supplied from an electric motor, it will be readily understood that any other well-known form of motor may be substituted therefor.

The invention further comprises various details of construction and arrangement of parts for carrying out the above objects in a simple, effective, and economical manner.

In the accompanying drawings, illustrating my invention, Figure 1 is a top plan view of a mining-machine constructed in accordance with my invention. Fig. 2 is a rear view in elevation, a portion being broken away to show the gearing used in drilling. Fig. 3 is a side elevation of the apparatus, showing it in its working position. Fig. 4 is a detached view of a portion of the apparatus for removing the "cuttings." Fig. 5 is a side view of Fig. 4. Fig. 6 shows the disposition of the drills while in operation. Fig. 7 shows the form of transverse cut made by the drilling-machine. Fig. 8 illustrates a form of apparatus for removing the cuttings slightly different from that shown in Fig. 4.

In the drawings, A represents the frame of the machine consisting of two end parts or castings D *d*, connected together by tubular guides C, through which the drill or auger stocks pass. The rear part or casting B is preferably formed hollow, as at *a*, to afford a chamber for the reception of the mechanism for driving the augers. This casting is provided with a rearward extension *b*, forming a support for the standards, in which the rear ends of the motor-shaft and the speed-reducing pinions are journaled. Said casting B has formed upon either side a hub, upon which the main carrying-wheels C′ C′ are journaled.

Passing through openings in the front wall of the casting B and secured at suitable distances apart are numbers of hollow tubes C C, secured at their opposite ends in openings in the beam, bar, or casting which forms the front end of the frame A. Through these tubes pass the drill-stocks *e*, to which the cutting-tools or augers *f* are secured, said drill-stocks being provided at their inner ends with intermeshing driving-pinions *i*, located in the chamber or recess of the casting B, to which motion is transmitted from the motor through intermediate gearing hereinafter described. The cutting-tools *f* are attached to their stocks by the ordinary means and preferably at right angles with respect to one another, so that they will freely revolve without interference but still cut a continuous transverse opening, one cutter lapping the other when in operation. The electric motor D being suitably supported upon the casting B, the rear end of its armature-shaft is provided with a small pinion *g*, adapted to mesh with larger gear-wheels *h h*, mounted in standards upon the frame, as above described. Two of the drill-stocks, located near the center of the series, are extended rearwardly and provided with additional pinions *k k*, which mesh with the larger speed-reducing pinions *h h*. It will be apparent that when the armature-shaft is set in motion the large pinions *h h* will transmit the power through the pinions *k k* to the drill-stocks, and thence through the intermeshing gears *i* to all the drills of the series.

The gearing hereinbefore described for transmitting motion from the armature to the drills may obviously be modified in a variety

of ways and the relative speeds be varied by changing the sizes of the driving-gears *h* and pinions *k*.

The gearing herein shown presents points of advantage over those heretofore used, and is preferred by me, since it provides a simple means for transmitting power, and as the augers rotate in opposite directions at all times keeps the machine well balanced when in operation.

As a further and special improvement in machines of this character I have devised a new arrangement for automatically feeding forward the apparatus while in use. This is best illustrated in Figs. 1, 2, and 3 of the drawings. As shown, two of the drill-stocks, located near either side of the series, are extended to the rear to about the same distance as the two drills just referred to, said stocks being provided with pinions *l l* upon their ends. These pinions *l l* mesh into and serve to drive two gear-wheels G G, keyed upon feed-screws H H, which rest at one end in bearings secured to the frame A. The feed-screws are of any desired length and extend rearward of the machine and pass through nuts or bushings *m m*, permanently secured within openings formed in supports or uprights I I, which are fastened between the roof and floor of the mine. These uprights I I consist of suitable beams or posts resting at their lower ends against the floor of the mine and provided with adjusting-screws at either or both ends. As shown, their upper ends have cross-pieces K K, pivoted thereto and having screw-threaded openings at either end. Through these openings in the pivoted cross-pieces pass screw-bolts *n n*, which are adapted to be screwed up against the wall of the mine, thereby holding the uprights securely in position. It will be obvious that any sufficiently strong frame or block may be substituted for the uprights.

When rotary motion is imparted to the drills, as above described, the feed-screws will be rotated through the pinions *g* and gear-wheels G G, thereby forcing the whole machine forward upon its supporting-wheels B B and pressing the augers against the work. For the purpose of preventing too rapid feeding of the drills, either the pitch or the speed of the feed-screw may be regulated as desired.

It will be seen that the uprights can be arranged in close proximity to the machine, thereby enabling it to be operated in a very small space, and, further, as the feeding is entirely automatic no manual attendance is necessary to throw the feed mechanism into and out of operation, as is the case in most machines of this character.

In order to render the machine entirely automatic in its action, it is necessary to provide means for removing the cuttings while the process of drilling is being carried on, and a construction for accomplishing this result is shown in Figs. 1, 4, and 5.

Journaled in rearwardly-extending arms *o* *o*, attached to the frame A, is a roller M, provided with rows of projecting lugs *p p*, forming a sprocket-roller. Over this is trained one end of a flexible apron moving in a plane below that of the cutters and trained at its forward end over a smaller sprocket-roller M′, journaled in arms projecting beneath the part *d* of the frame A and supported almost on a level with the bottom of the cut. This flexible apron is in the form of a link belt, the longitudinal pieces being united by transverse bars *q q*, of iron or steel, projecting at right angles to the plane of movement of said apron, said bars serving as scrapers, which in their movement will carry away the débris and cuttings from the tools. The flexible apron is desirably made in two parts, as shown in Fig. 4, in order to make it practicable to apply power for revolving the same to the middle of the roller. It will of course be understood that the desired movement may be imparted to it in any suitable way; but I prefer to use the means shown in the above figures, and which will now be described. The central one of the spindles or drill-stocks *e* projects from the machine proper and carries upon its end a worm-screw *r*, which is arranged to actuate a worm-gear *s*, sunk within the periphery of the roller M at its central portion. In the movement of the drill-stocks, therefore, the roller M, through the worms *r* and *s*, will be revolved, thereby giving motion to the flexible apron, thus removing the cuttings from the hole to the rear of the machine, whence it can be hauled away.

In Fig. 8 is shown another form of mechanism for removing the waste material. As therein shown, the drill-stocks are dispensed with, and instead the latter are preferably made of greater diameter and provided with conveyer-worms or Archimedean screws *t t*, such as used in grain-conveyers. The pitch of the screws is so deep that by reason of the peculiar arrangement of cutters hereinbefore described the high part of the screw upon each stock will register with the low part on those adjacent, so that a compact gang of conveyers is provided by which the material as soon as disintegrated is carried to the rear of the apparatus.

I am aware that it has been heretofore proposed to arrange the cutters of a mining-machine to rotate simultaneously in opposite directions and to overlap while boring; also, that it is broadly old to provide an arrangement movable on the main frame of the machine for automatically feeding forward the drills; and, further, that it is old to automatically remove the waste material while the operation of drilling is going on, and I do not broadly claim these features, my invention, broadly speaking, consisting in combining, with the mechanism for operating the drills, an arrangement for automatically feeding forward the entire machine, operated from the machine, but partially supported independently thereof.

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

1. A mining-machine comprising a movable frame, a series of drill-stocks mounted thereon and having intermeshing pinions, a rigid support independent of the frame secured between the floor and roof of the mine, a feed-screw mounted at one end on the frame and passing through said rigid support, an endless apron supported at the front and rear of the machine, provided with scrapers for removing the borings, a motor carried by the movable frame, and driving connections between the motor and the drill-stocks, feed-screw, and endless apron, whereby all the operations of the machine are carried on simultaneously.

2. A mining-machine comprising a movable frame, a series of drill-stocks mounted thereon and having intermeshing pinions, a rigid support independent of the frame secured between the floor and roof of the mine, a feed-screw mounted at one end on the frame and passing through said rigid support, sprocket-rollers journaled at the front and rear of the machine, an endless apron trained on said sprocket-rollers, scrapers arranged transversely on said endless apron, a motor carried by the movable frame, and driving connections between the motor and the feed-screw, drill-stocks, and endless apron, whereby all the operations are carried on simultaneously.

3. In a mining-machine, in combination with a movable frame, a series of drill-stocks mounted thereon and having intermeshing pinions, one of said drill-stocks extending to the rear and provided with a worm-screw, a motor for rotating the drill-stocks, a feed-screw mounted at one end in bearings on the frame and at the other end engaging a fixed support independent of the frame, sprocket-rollers journaled in bearings on the front and rear of the frame, that on the rear being provided with a worm adapted to engage the said worm-screw, and connections between the motor and said parts.

4. In a mining-machine, in combination with a movable frame, a series of drill-stocks mounted thereon and having intermeshing pinions, two of said drill-stocks located on either side, the center being extended to the rear and provided with additional pinions, a motor mounted on the frame, its armature-shaft being provided with a pinion, a gear upon either side of the armature-shaft interposed between the armature-pinion and the end pinion of the said drill-stocks, the central drill-stock of the series having a worm-screw on its end, a feed-screw mounted at one end in bearings on the frame and at the other end engaging a fixed support independent of the frame, sprocket-rollers journaled in bearings on the front and rear of the frame, that on the rear being provided with a worm adapted to engage the said worm-screw, and suitable driving connections between the motor and the feed-screw, whereby all the parts are driven in unison.

5. In a mining-machine, in combination with a movable frame, a series of drill-stocks mounted thereon and having intermeshing pinions, two of said drill-stocks located adjacent to the center being extended to the rear and provided with additional pinions, a motor mounted on the frame, having a pinion on its armature-shaft, a gear upon either side of the armature-shaft interposed between the armature-pinion and the end pinions of said drill-stocks, the central drill-stock of the series having a worm-screw on its end, additional pinions L L upon two other drill-stocks, a feed-screw upon either side of the machine mounted at one end in bearings on the frame and provided with a pinion intermeshing with said pinion *l* and at its other end engaging a fixed support independent of the frame, and sprocket-rollers journaled in the bearings on the front and rear of the machine, that on the rear being provided with a worm adapted for engagement with said worm-screw, whereby all the parts are driven in unison from the armature-shaft.

6. A supporting-frame for mining-machines, comprising end bars rigidly connected by tubes through which the drill-stocks pass, a motor mounted upon one of said bars or castings, and suitable supporting-wheels journaled upon said bar or casting, the latter being hollow for the reception of intermeshing pinions on the drill-stocks and having a rearward extension upon which are mounted speed-reducing gears and speed-operating mechanism, both said bars or castings being formed with depending arms for supporting sprocket-rollers, upon which is trained an endless conveyer.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES J. VAN DEPOELE.

Witnesses:.

FRANKLAND JANNUS,

JOHN W. GIBBONEY.