(No Model.) 3 Sheets—Sheet 1.

J. BOLAND & G. W. FRITZ.

MINING MACHINE.

No. 501,402. Patented July 11, 1893.

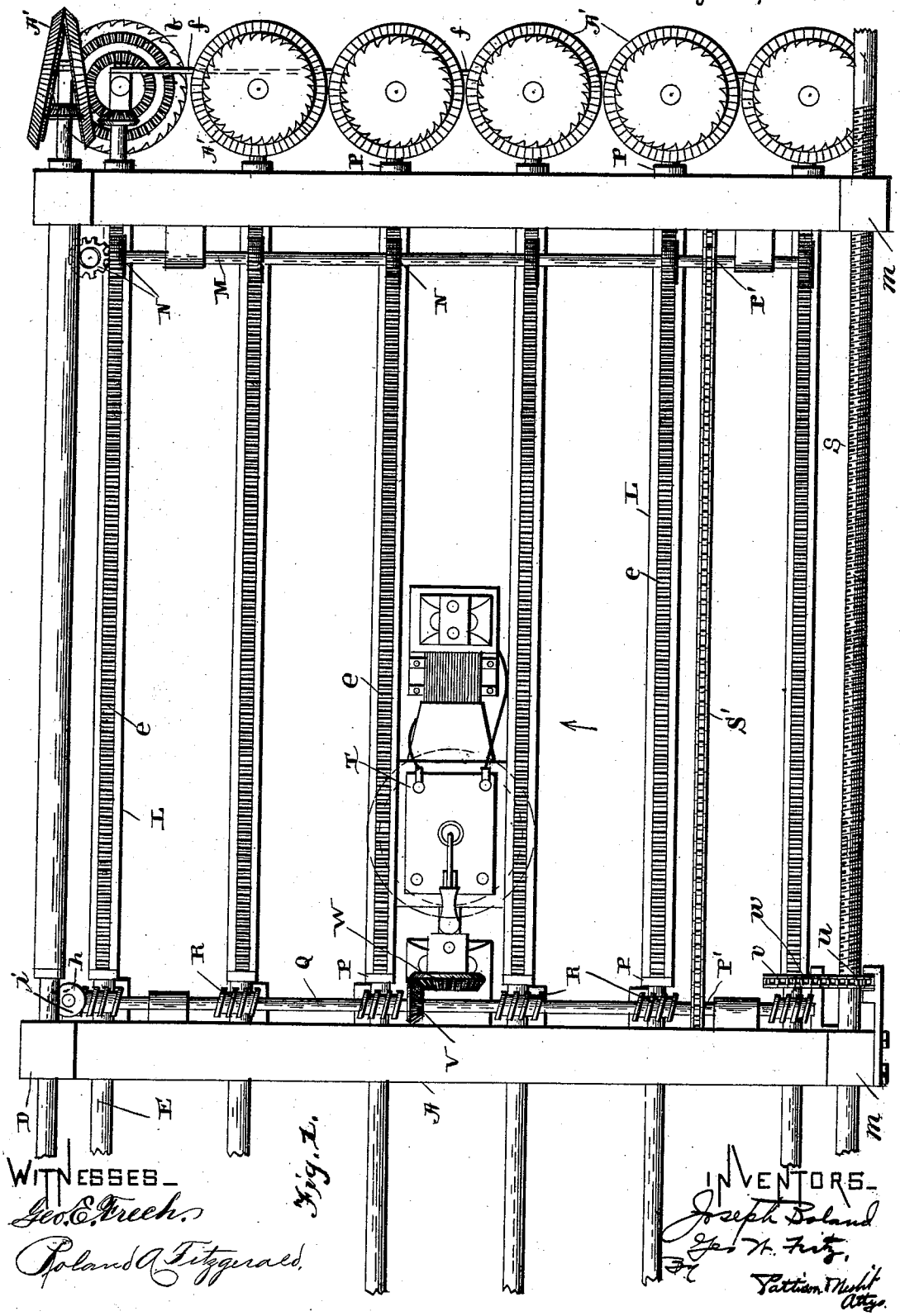

Fig. 1.

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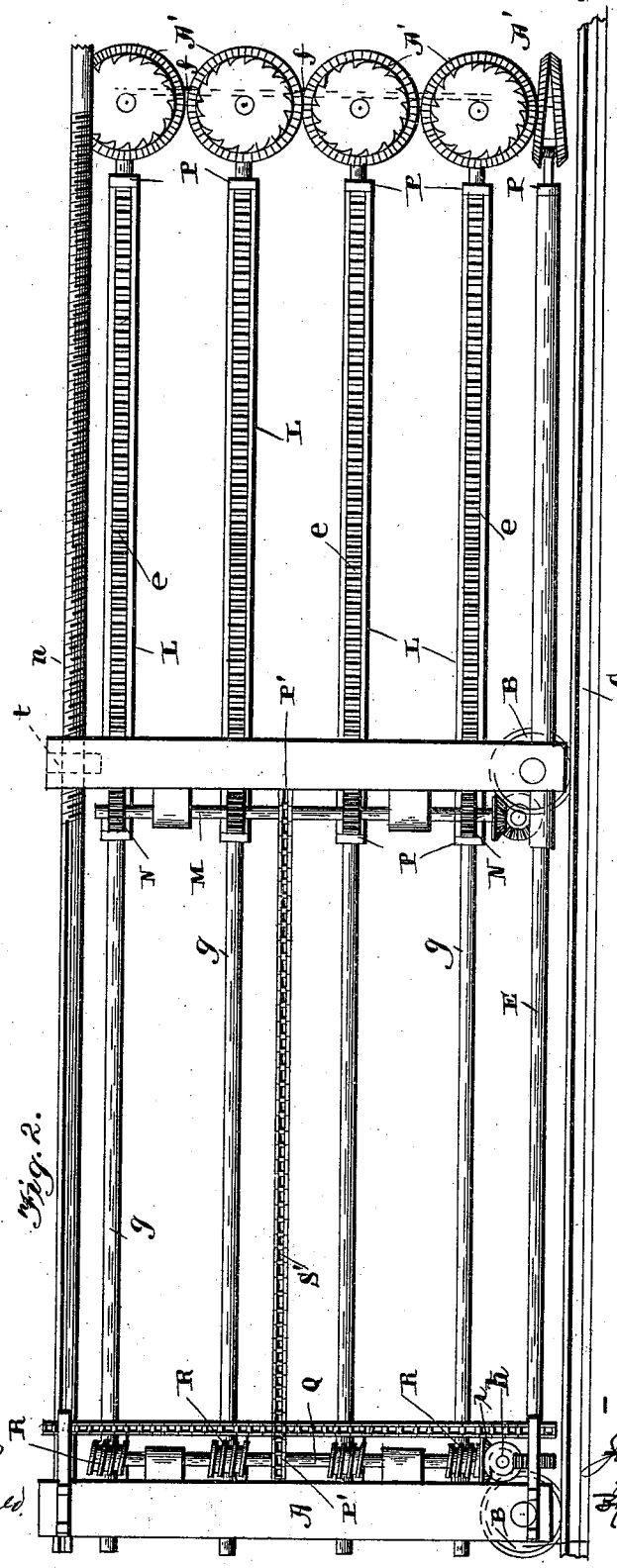

Fig. 2.

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(No Model.) 3 Sheets—Sheet 3.

J. BOLAND & G. W. FRITZ.

MINING MACHINE.

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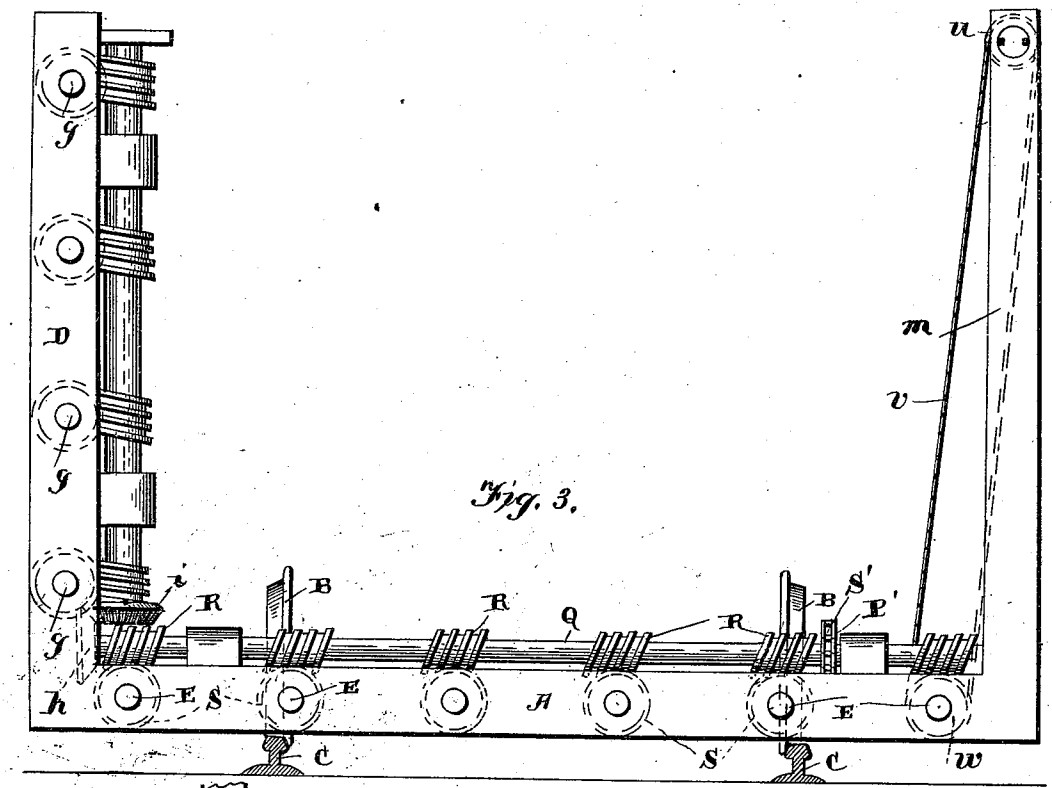

Fig. 3.

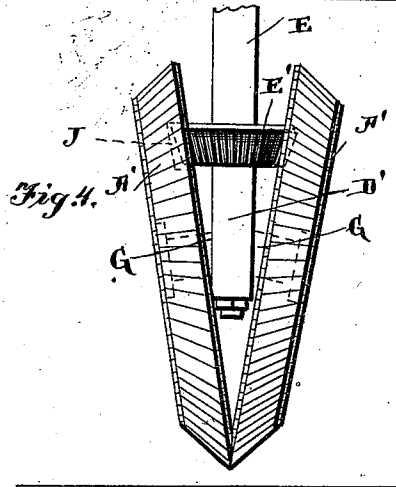

Fig. 4.

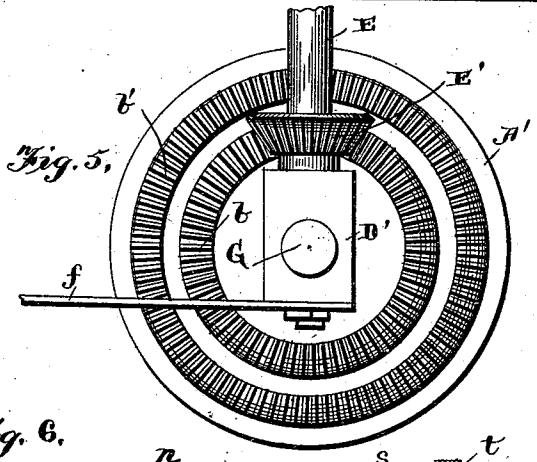

Fig. 5.

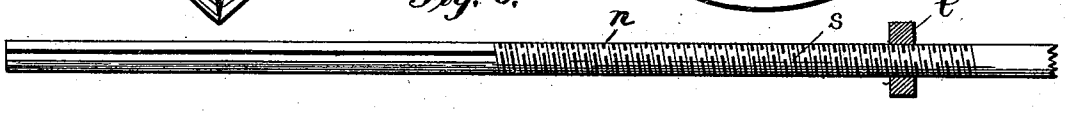

Fig. 6.

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UNITED STATES PATENT OFFICE.

JOSEPH BOLAND AND GEORGE W. FRITZ, OF PITTSBURG, PENNSYLVANIA.

MINING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 501,402, dated July 11, 1893.

Application filed April 5, 1893. Serial No. 469,136. (No model.)

To all whom it may concern:

Be it known that we, JOSEPH BOLAND and GEORGE W. FRITZ, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Mining-Machines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

Our invention relates to improvements in mining machines, and it consists in the construction and arrangement of parts which will be fully pointed out, and particularly referred to in the claims.

One object of our invention is to provide an improved mining machine consisting of a horizontal series of cutters and a vertical series of cutters forming together an L, and at the opposite diagonal corner from that formed by the horizontal and vertical series of cutters, a drill is provided for the purpose of giving a hold for a blasting cartridge.

Another object of our invention is to support a cutter upon a shaft and have them formed in pairs and placed at an angle to each other, so that their outer edges either engage or are very near together, one of the said cutters being driven by a gear upon the shaft while the other cutter is driven by intermeshing with the driven cutter.

The object of our invention also consists in the particular construction and arrangement of parts which will be fully described hereinafter.

In the accompanying drawings,—Figure 1, is a plan view of a machine which embodies our invention, one of the cutters of one pair of the horizontal gears being removed. Fig. 2, is a side elevation of the same, looking in the direction indicated by arrow in Fig. 1. Fig. 3, is an end view of the same. Fig. 4, is an enlarged edge view of one pair of the cutters. Fig. 5, is a plan view of one of the cutters. Fig. 6, is a detached view of the drill.

A indicates a horizontal rectangular frame, and B supporting wheels therefor which rest upon a track C. At one side of the horizontal frame A is a vertical frame D which is substantially like the horizontal frame A.

Supported in suitable bearings in the horizontal frame A, is a series of shafts E, which move endwise and revolve therein. The outer ends of these shafts E have supported and journaled thereon a socket or casting D′, which casting D′ is provided with two laterally extending pins G upon which are journaled the two cutters A′. These pins G which form journals for cuttters A′, are placed at an angle, as shown, so that the outer edges of the said cutters come together substantially as shown in Fig. 4. The outer ends of the shafts E have placed thereon holding nuts or other equivalent devices outside of the socket or casting D′, so that the socket is held in place upon the end of the shaft while at the same time the shaft is allowed a free revolution independent thereof.

The cutters A′ are provided each with side and edge cutters and the edges of the said cutters are cut at an incline so that their outer meeting peripheries form a point, as shown in Fig. 4, whereby they enter and more readily cut into the substances being mined.

Placed upon the shafts E are the gear wheels E′, which engage with one of the cutters of each pair, which cutters are provided on their inner faces with gear teeth or cogs *b*, for that purpose. The other cutter of each pair is provided with an annular groove J, which however is not provided with any teeth and in this groove the opposite periphery of the cog wheel or pinion E′ freely revolves without affecting the said cutter. These cutters however which are provided with annular grooves have at their inner peripheries cogs or teeth *b*′, which engage with similar formed cogs or teeth formed upon the other cutters which are driven by the shafts E. From this description it will be seen that the shafts E drive one of the cutters of each pair while that cutter drives its fellow cutter in the same direction by engaging its inner periphery as clearly shown in Figs. 4 and 5, and which will be readily understood.

Surrounding the shafts E are the tubes L, which are provided on their upper faces with a longitudinal series of cog teeth *e*, and the outer ends of the tubes L, abut against collars P upon the shafts as clearly shown in Fig. 2. A transverse shaft M is journaled in the frame A, and this shaft is provided with

a series of pinions N, one respectively for each of the said tubes, and by means of which the tubes are moved endwise carrying with them the shafts and the cutters supported at the outer ends thereof.

At the opposite end of the frame is a transverse shaft Q, which carries a series of worms R, and these worms engage respectively with suitably shaped cog wheels or pinions S upon the shafts E. By this means the shafts E are revolved and a sprocket chain or belt S′, passes around the sprocket wheels P′ upon the shafts Q and N respectively, thus operatively connecting the two parallel but transverse shafts. The transverse shaft Q is driven by means of a motor T carrying a beveled gear wheel W, which engages a beveled gear V upon the shaft Q. We here show an electric motor for the reason that it is considered by us as being the most convenient, but we do not however wish to limit ourselves to any particular kind of motor for that may be varied at will without departing from the spirit of our invention. It will thus be seen that the shaft Q derives motion from the motor and this shaft Q revolves the shaft E, which carries the cutters at their opposite ends, and through the shafts E, as heretofore shown, the cutters are driven in pairs and each cutter of each pair driven in the same direction. So also through the medium of the motor, the shaft Q and the sprocket chain F, the transverse shaft M is driven, and this transverse shaft M moves the tubes L surrounding the shafts E outward carrying with them the cutters, as rapidly as they cut their way. A brace *f*, extends across between the horizontal pairs of cutters, and the ends of the shafts E are passed therethrough for the purpose of holding the cutters in a horizontal position, as will be clearly understood.

As hereinbefore mentioned at one side of the horizontal frame A is a vertical frame D and journaled in this vertical frame D are a vertical series of shafts, *g*, which carry at their outer ends a vertical series of cutters, which are identical in construction and mode of operation to the horizontal cutters supported by the shafts E, and therefore do not need any particular description. These shafts *g* are also provided with tubes constructed exactly like those shown in Fig. 1, and this frame D is likewise provided with shafts corresponding with the shafts Q and N of the frame A, and operating in identically the same manner and for the same purpose. The shaft in the frame D corresponding to the shaft Q is driven by a bevel wheel *h*, upon the said shaft Q, which intermeshes with a bevel wheel *i*, upon the said shaft. From this description it will be seen that a single motor drives a horizontal series of wheels which will cut a horizontal slot in the material which is to be mined and also a vertical series of cutters which will cut a vertical slot in the material to be mined, thus forming together an L in the said material, the said cutters, both the vertical and horizontal series, being fed forward in the manner before described as rapidly as they cut their way, and automatically.

Projecting from opposite sides of the horizontal frame A, from the frame D, are the standards *m*, to the upper ends of which is journaled a drill *n*. The inner end of this drill *n*, is provided with a screw thread *s*, which passes through a nut *t*, upon one of the standards and the said drill is also provided with the sprocket wheel *u*, around which the sprocket chain *v*, passes, and this sprocket chain also passes around a sprocket wheel *w*, upon one of the shafts E of the horizontal frame. By this means motion is transmitted from one of the horizontal shafts E, preferably the outside one to the said drill. The drill as it is being revolved owing to the screw thread thereon is moved endwise in unison with the endwise movement of the series of cutters, at the same time an L is being cut in the material being mined, so also a hole is being drilled in a position diagonal from the junction of the horizontal and vertical series of cutters. The object of drilling this hole is for the purpose of inserting a cartridge or blast, whereby after the machine is run backward and a blast inserted the whole rock will be readily blown out to be broken up and carried out of the mine.

From the above description it will be seen that we have a mining machine of very simple construction which will cut an L slot and simultaneously therewith drill a hole for the purpose of blasting out a large piece of material or substance being mined.

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

1. A mining machine comprising a horizontal series of shafts carrying at their outer ends a series of cutters, tubes surrounding the said shafts, and having rack teeth, the said tubes abutting against a stop on the said shafts, a transverse shaft engaging respectively all of the said horizontal revolving shafts, and a transverse shaft gearing with each of the said tubes and a motor for driving the said shaft, substantially as set forth.

2. A mining machine comprising a series of parallel shafts carrying cutters at their outer ends, intermeshing gear between the said cutters and the said shafts, a tube for each of the said shafts abutting against a stop thereon and having rack teeth, a transverse shaft for driving the parallel shafts, a transverse shaft and having cog wheels engaging and driving the said tubes, a motor for one of the transverse shafts, and intermediate gearing between the driven transverse shaft and the other transverse shaft, substantially as described.

3. A mining machine comprising a revolving shaft, a socket or casting loosely placed upon the end thereof a connection holding the casting in position, two cutters supported by the said casting and journaled thereon, a cog

wheel upon the said shafts engaging one of the cutters, and the said cutter engaging and driving the other cutter, substantially as set forth.

4. A mining machine comprising a revolving shaft, a casting journaled upon the end thereof a connection holding the casting in position, two cutters journaled upon the said casting, a cog wheel upon the shaft driving one of the cutters, and the said cutters intermeshing whereby one drives the other, substantially as specified.

5. A mining machine comprising a shaft, a casting journaled thereon, two cutters journaled upon the said casting at an angle to each other, their outer peripheries approaching, the edges of the said cutters being at an incline as shown, so that they together form a point, a gear upon the said shaft driving one of the said cutters, and the cutters having cogs at their inner edges which intermesh at their outer converging ends, whereby one cutter is driven by the other, substantially as described.

6. A mining machine comprising a revolving shaft, a casting journaled on the end thereof a connection holding the casting in position, two cutters journaled upon the said casting and extending at an angle to each other, their outer peripheries engaging for the purpose described, a gear upon the shaft for driving one of the said cutters, the other cutter provided with an annular groove through which the outer periphery of the said gear revolves, substantially as specified.

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

JOSEPH BOLAND.
GEORGE W. FRITZ.

Witnesses:
R. H. LINDSAY,
W. J. RHEA.