(No Model.) 2 Sheets—Sheet 1.

J. IRGENS.

ROCK DRILLING MACHINE.

No. 422,130. Patented Feb. 25, 1890.

Fig: 1.

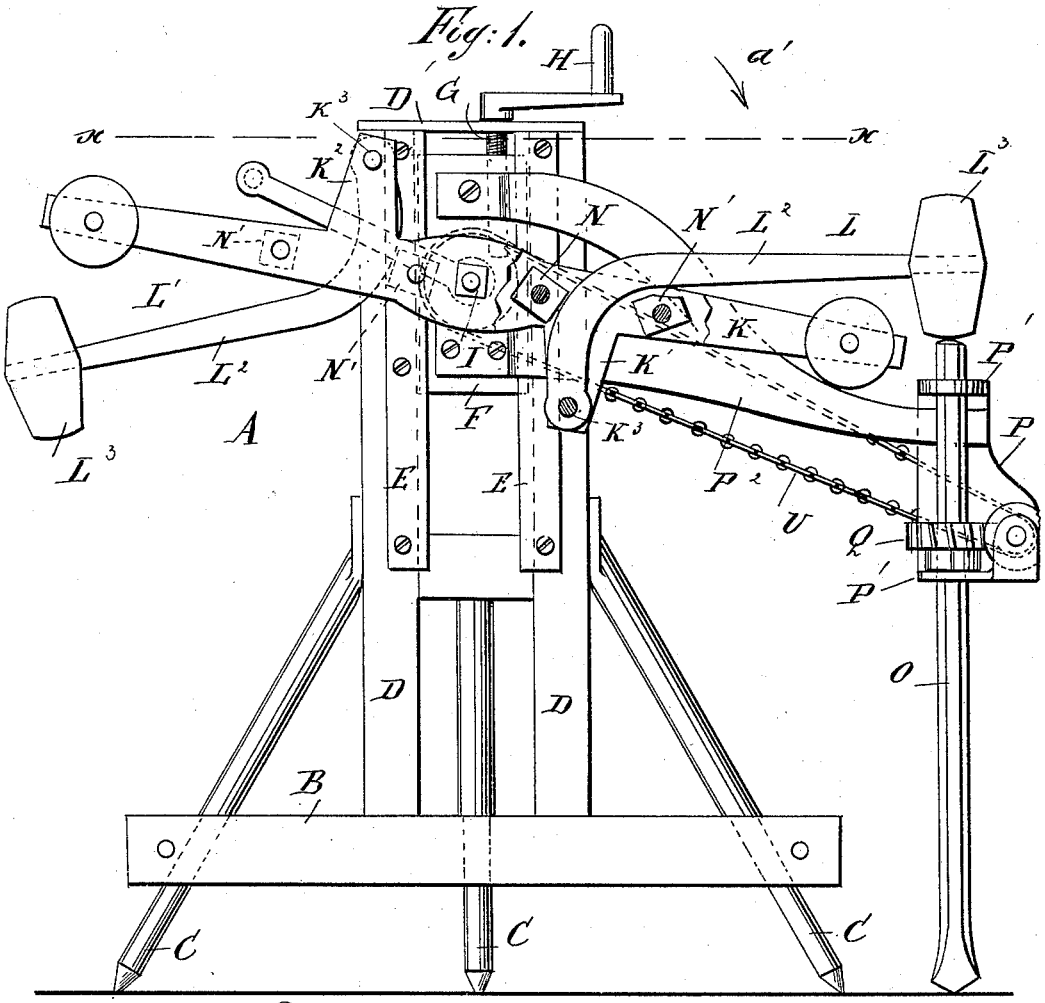
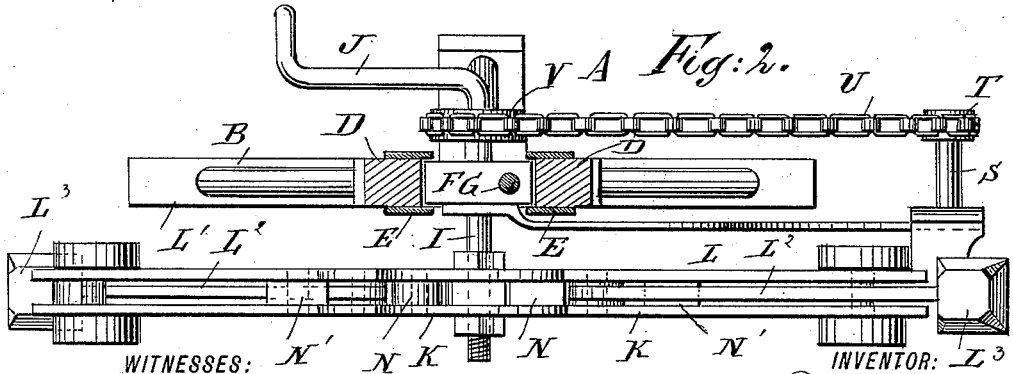


Fig: 2.



WITNESSES:

Chas. Nida.

C. Sedgwick

INVENTOR:

J. Irgens

BY Munn & Co

ATTORNEYS.

(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

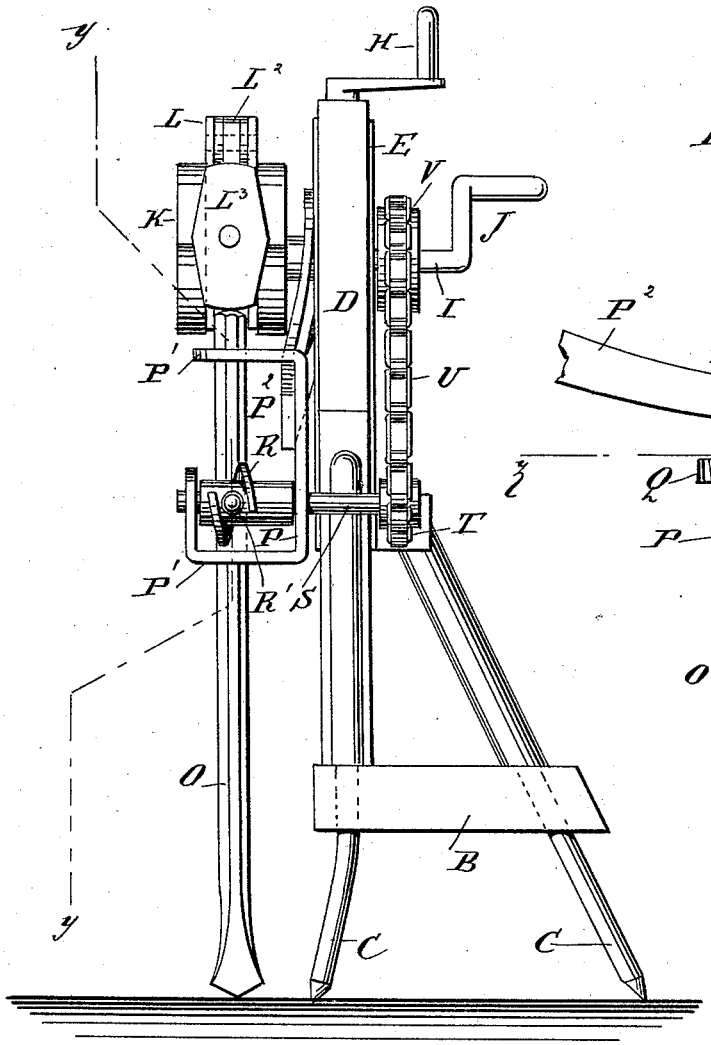


Fig. 4.

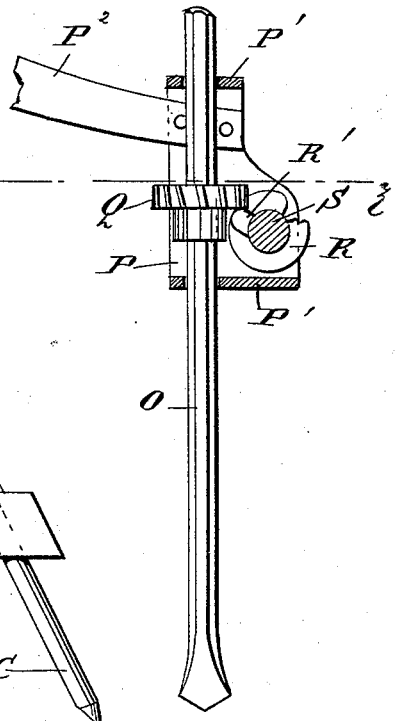
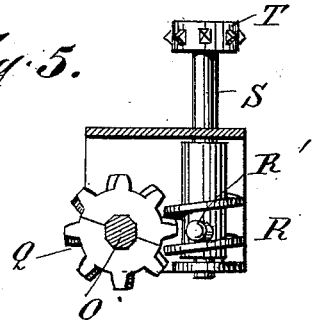


Fig. 5.



WITNESSES:

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C. Sedgwick

INVENTOR:

J. Irgens

BY Munn & Co

ATTORNEYS.

UNITED STATES PATENT OFFICE.

JACOB IRGENS, OF PALISADE, (DAKOTA TERRITORY,) SOUTH DAKOTA.

ROCK-DRILLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 422,130, dated February 25, 1890.

Application filed October 8, 1889. Serial No. 326,323. (No model.)

To all whom it may concern:

Be it known that I, JACOB IRGENS, of Palisade, in the county of Minnehaha and Territory of Dakota, have invented a new and Improved Rock-Drilling Machine, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved rock-drilling machine which is simple and durable in construction and very effective in operation, and adapted to be set in motion by hand or other power.

The invention consists in certain parts and details and combinations of the same, as will be described hereinafter, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of the improvement, with parts broken out, and adapted for hand-power. Fig. 2 is a sectional plan view of the same on the line *x x* of Fig. 1. Fig. 3 is an end elevation of the same. Fig. 4 is a sectional side elevation of the drill-holder on the line *y y* of Fig. 3, and Fig. 5 is a sectional plan view of the same on the line *z z* of Fig. 4.

The improved drilling-machine A is provided with a suitably-constructed base B, supported on lugs C. On the base B are erected the standards D, provided near their upper ends with a suitable guideway E, in which is mounted to slide vertically a carriage F, adapted to be raised and lowered by a screw-rod G, held in the cross-beam D′, fastening the upper ends of the standards D together.

On the upper end of the screw-rod G is held a handle or crank-arm H, for conveniently turning said screw-rod G to raise or lower the carriage F. In the latter is mounted to turn a shaft I, provided on one end with a crank arm or handle J, for turning the said shaft I, and at its other end is secured an arm K, provided on opposite sides of the shaft I with offsets K′ and K^2, extending in opposite directions, and in the outer ends of which are fulcrumed, at K^3, the ends of the handles L^2 of the hammers L and L′, respectively. The shaft I may be connected by suitable means with machinery for turning the shaft by power. Each of the hammers L and L′ is provided with the usual head L^3, of any desired weight, and each of the handles L^2 is preferably made L-shaped, as is plainly shown in Fig. 1. The swinging movement of the handles L^2 is limited by rubber cushions N and N′, held on the arm K, and between which pass said handles at their bent parts. (See Fig. 1.) The heads of the hammers L and L′ are adapted to engage the upper end of the drill-tool O, of the usual shape, and loosely mounted in bearings P′, formed on a frame P, supported by an arm P^2 from the carriage F, so that when the latter is raised and lowered, as previously described, the said frame P, with its attached parts, will also be raised or lowered.

The drill-tool O is usually polygonal in cross-section and passes through a correspondingly-shaped opening formed in the center of a worm-wheel Q, in mesh with a worm R, mounted on a shaft S, extending transversely and turning in suitable bearings on the frame P. The worm-wheel Q is preferably made in two parts adapted to be bolted together, so as to be conveniently fitted onto the drill-tool O. On one end of the shaft S is secured a sprocket-wheel T, over which passes a sprocket-chain U, also passing over a sprocket-wheel V, fastened on the shaft I, carrying the arm K. Between the threads of the worm R are arranged one or more projections R′, adapted to engage the under side of the corresponding tooth of the worm-wheel Q, so as to lift the same to raise the drill-tool O previous to being struck by one of the hammers L or L′.

The operation is as follows: When the several parts are in place, as shown in Fig. 1, the base B is set in such a manner that the cutting-end of the tool O touches the rock at the place where the hole is to be driven. The operator then turns the crank-arm J, so that the shaft I turns in the direction of the arrow *a*′, thus imparting a swinging motion to the arm K. The arm K causes the hammers L and L′ to alternately drop with their heads L^3 on the upper end of the drill-tool O, so that the latter is driven into the rock. It will be seen that when the arm K is about

to pass the vertical position the hammer L or L′ on the uppermost end of the arm K still stands rearwardly inclined, resting with its handle L^2 against the cushion N. Now, on a further movement of the arm K the head L^3 of the said hammer finally swings downward, so that the end of the arm K is moved into such a lowermost position that the full force of the hammer strikes the drill-tool O before the handle L^2 of the said hammer comes in contact with the cushion N′. A further movement of the arm K causes the lug K′ or K^2, respectively, to draw the hammer L or L′ inward, so that its head L^3 passes off the top of the drill-tool and over the uppermost bearing P′ of the frame P to finally drop with its handle L^2 on the cushion N′. When the lowermost part of the arm K swings past the center, the respective hammer on this end swings downward, so as to rest with its handle L^2 against the respective cushion N. The hammer remains in this position until the arm has swung past the center when in its lowermost position, as previously described. The rotary motion of the shaft I causes a similar motion of the shaft S by means of the sprocket-wheels T and V and the sprocket-chain U. The movement of the shaft S turns, by means of the worm R, the worm-wheel Q, whereby the drilling-tool O is turned continually but slowly, so that the cutting-edge of the drilling-tool O strikes the rock at different places whenever driven downward by one of the hammers L or L′, as previously described. The cutting-edge of the drilling-tool thus forms a round hole. The drill-tool O is lifted once for every revolution of the worm R by the projection R′ engaging the under side of the corresponding tooth engaged by the threads of the screw R at that time. As the drill-tool O passes loosely through the worm-wheel Q, said worm-wheel lifts the drill-tool O when engaged by the projection R′ as the latter presses against the tooth at one side, so as to clamp the worm-wheel Q to the drill-tool O, and the latter is lifted with the worm-wheel Q. Thus it will be seen that the hammers L and L′ alternately drop on the drilling-tool O, and the latter is continually turned and raised, so that the cutting-edge of the drill-tool rapidly cuts a uniform aperture in the rock. It will further be seen that the hammers L and L′ counterbalance each other and serve as a fly-wheel, but an additional regular fly-wheel may be added on the shaft I whenever desired. It will further be seen that when the hole drilled by the drilling-tool O increases in depth the operator turns the handle H, so that the carriage F is lowered, thereby lowering the frame P at the same time, so that the upper end of the drilling-tool projects a suitable distance above the uppermost bearing P′ and can be conveniently engaged by the hammers L and L′. As the latter do not change their position in relation to the frame P, the operation, as above described, remains the same.

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

1. In a rock-drilling machine, the combination, with a frame, of a vertically-adjustable carriage in the said frame, a rotary shaft mounted in said carriage, an arm secured on one end of the shaft, hammers having their handles pivoted to the arm on opposite sides of the shaft, a frame supported from the carriage and adapted to carry the drilling-tool, a shaft mounted in the tool-holding frame, a worm on the second-named shaft, a worm-wheel mounted on the tool and engaged by the said worm, and means for operating the second shaft from the first-named shaft, substantially as herein shown and described.

2. In a rock-drilling machine, the combination, with the frame P, having bearings P′, and the drill O, of the worm-wheel Q, mounted on the drill, the shaft S, journaled in the frame, the worm R, mounted on the shaft S and having the projection R′ between the threads thereof, and means for operating the said shaft, substantially as and for the purpose set forth.

3. In a rock-drilling machine, the combination, with a frame provided with guideways, of a carriage held vertically adjustable in the said guideways, a shaft mounted in the said carriage and adapted to be turned, an arm secured on one outer end of the said shaft, hammers pivotally connected at their handle ends with the said arm at opposite sides of the said shaft, a frame supported from the said carriage and adapted to hold the drilling-tool, a shaft mounted to turn in the said frame and rotated from the said first-mentioned shaft, a worm held on the said second-named shaft, a worm-wheel engaged by the said worm and fitted onto the drilling-tool, and a lug or projection held in the said worm and adapted to engage the under side of the worm-wheel, substantially as shown and described.

JACOB IRGENS.

Witnesses:
M. H. WAUGRUES,
E. E. CROSS.