(No Model.) 2 Sheets—Sheet 1.

M. THONAR.

MACHINE FOR CUTTING STONE.

No. 568,077. Patented Sept. 22, 1896.

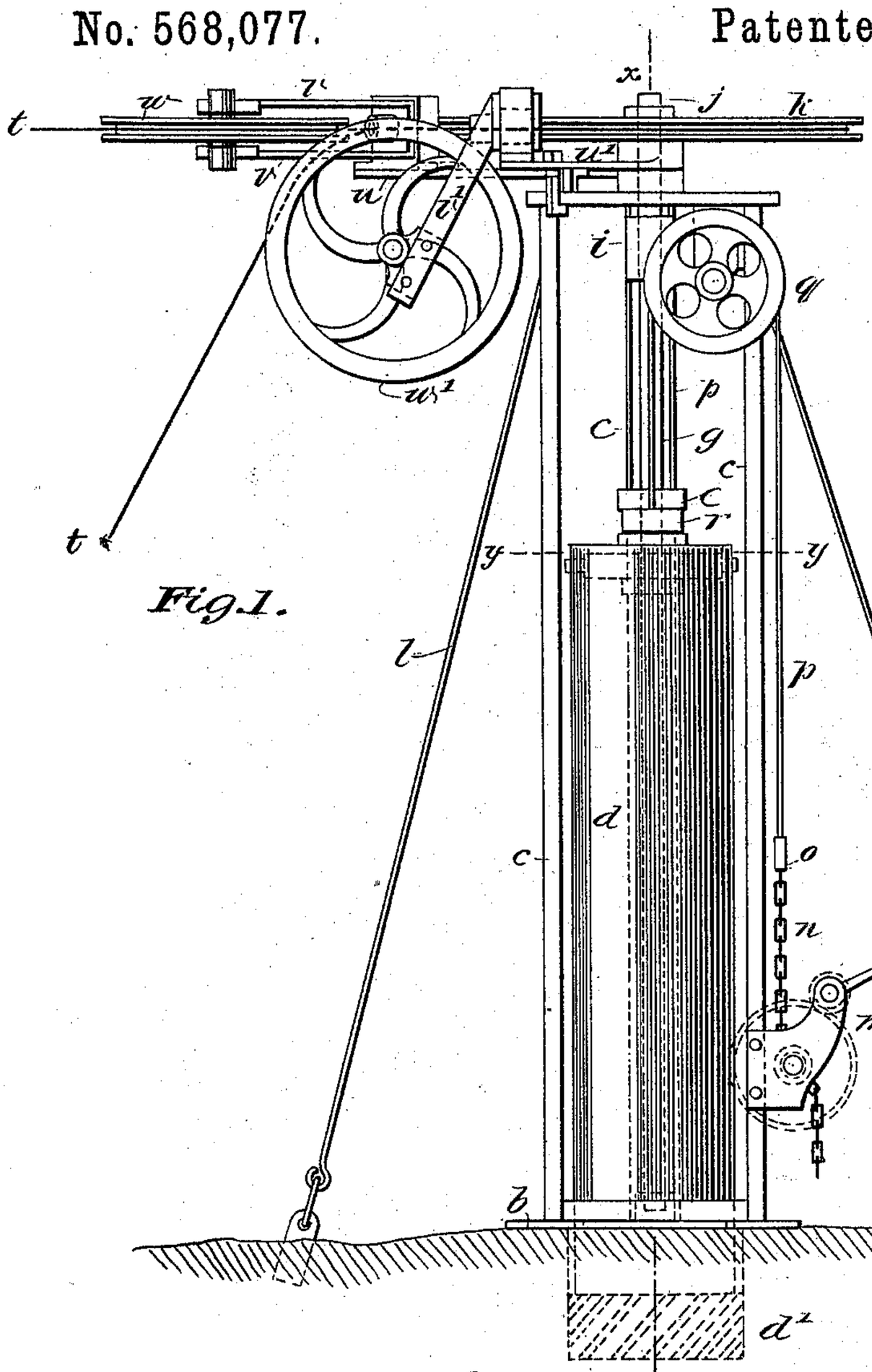
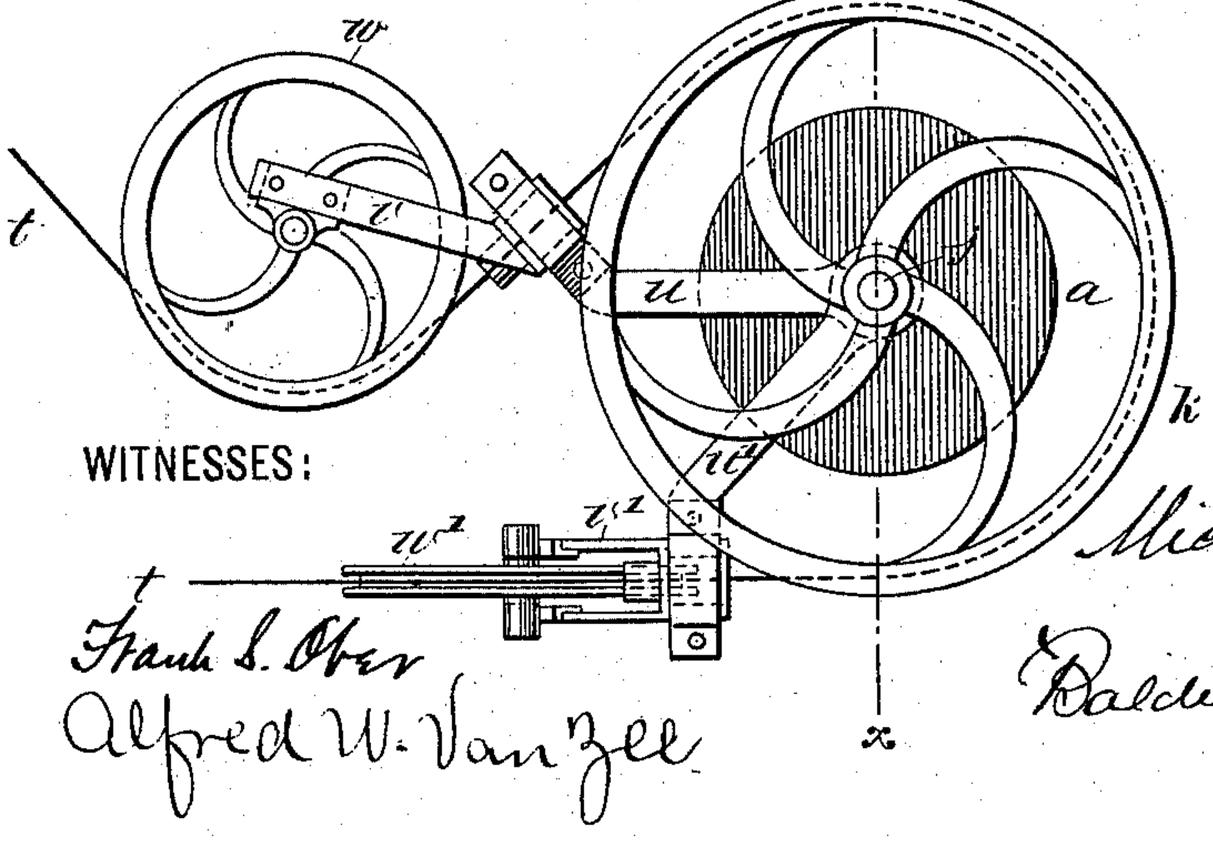


Fig. 1.

Fig. 2.



WITNESSES:

Frank L. Ober

Alfred W. Van Zile

INVENTOR

Michel Thonar

BY

Baldwin, Davidson & Wright

ATTORNEYS.

(No Model.) 2 Sheets—Sheet 2.

M. THONAR.

MACHINE FOR CUTTING STONE.

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Fig. 3.

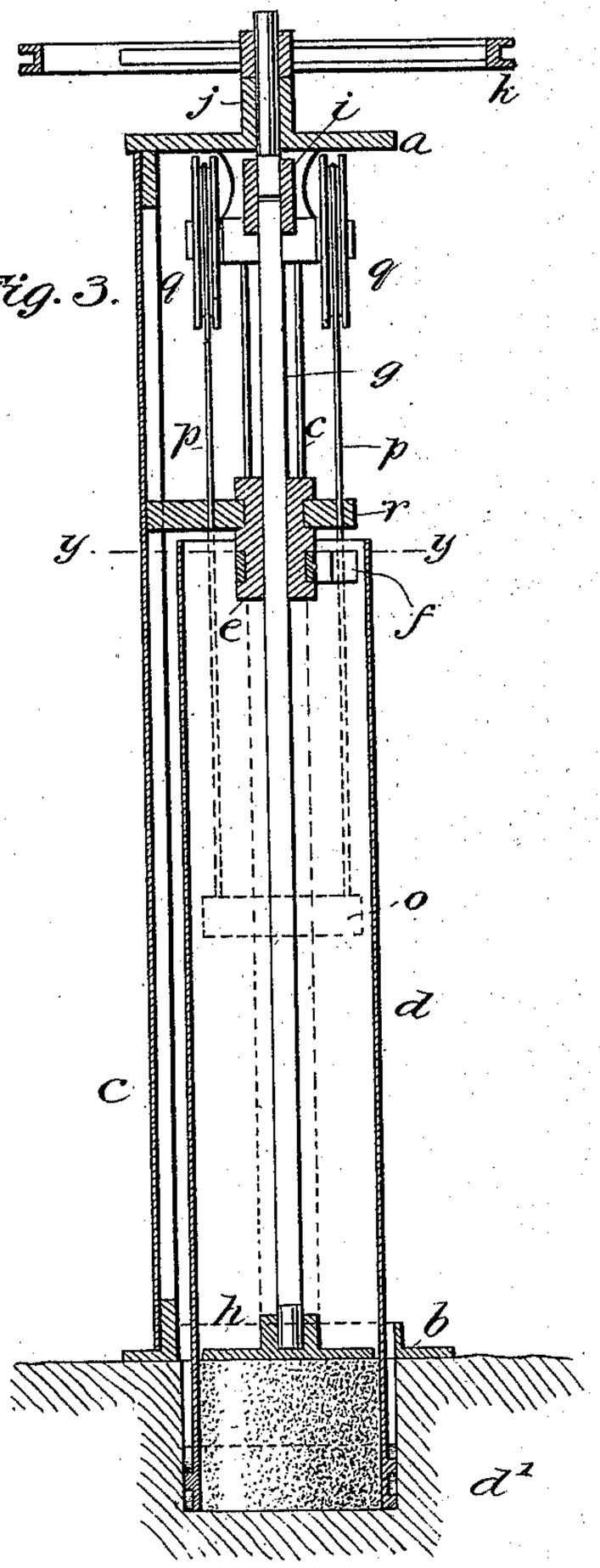


Fig. 5.

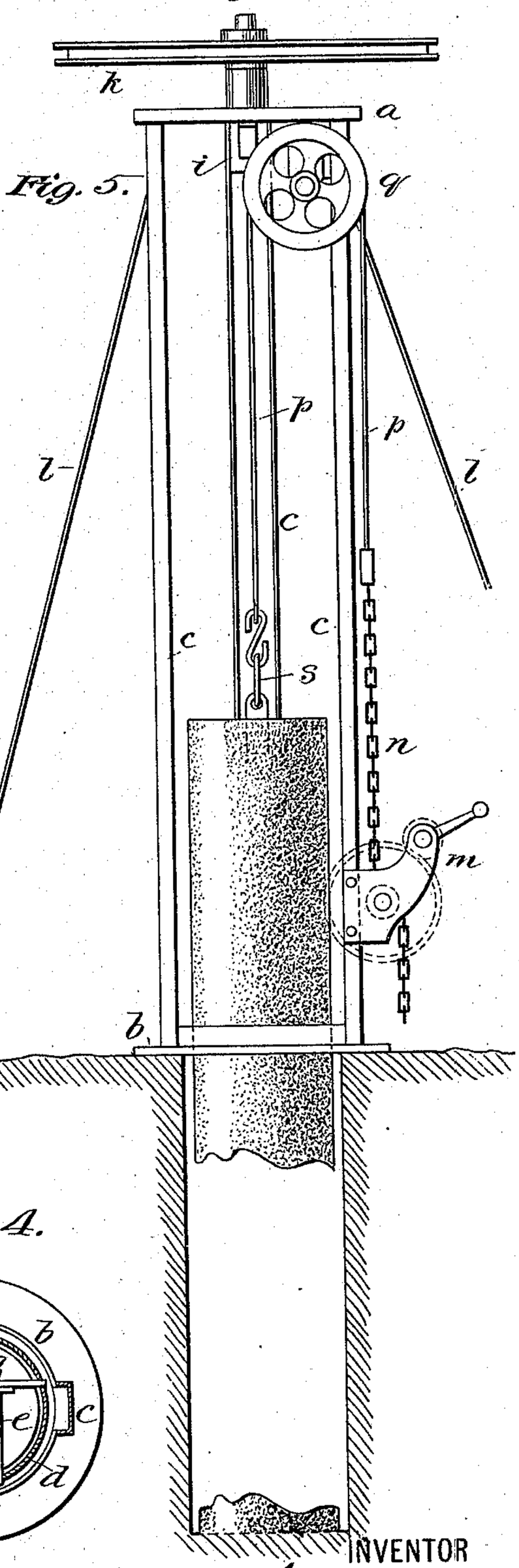
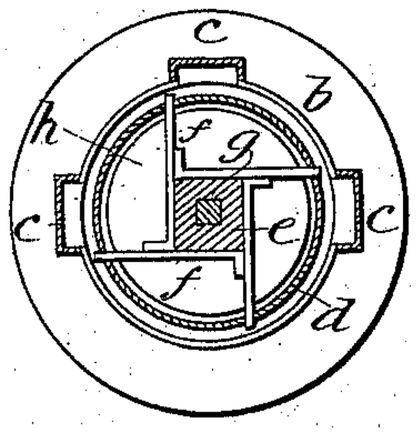


Fig. 4.



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UNITED STATES PATENT OFFICE.

MICHEL THONAR, OF NAMUR, BELGIUM, ASSIGNOR, BY MESNE ASSIGNMENTS, TO BATTERSON & EISELE, OF NEW YORK, N. Y.

MACHINE FOR CUTTING STONE.

SPECIFICATION forming part of Letters Patent No. 568,077, dated September 22, 1896.

Application filed July 2, 1894. Serial No. 516,379. (No model.) Patented in Belgium September 30, 1884, No. 66,355; in Austria-Hungary July 1, 1885, No. 12,496 and No. 36,242, and in Germany July 19, 1885, No. 34,060.

To all whom it may concern:

Be it known that I, MICHEL THONAR, a subject of the King of Belgium, residing at Namur, in the Kingdom of Belgium, have invented certain new and useful Improvements in Machines for Cutting Stone, (Case B,) of which the following is a specification.

Foreign patents have been granted to me upon the invention herein disclosed as follows: in Belgium, No. 66,355, dated September 30, 1884; in Germany, No. 34,060, dated July 19, 1885, and in Austria-Hungary, No. 12,496 and No. 36,242, dated July 1, 1885.

The machine forming the subject of this invention consists of a tubular rock-cutting device adapted to form an annular channel in the rock or stone upon which it is set to act; a frame for holding and guiding the tubular cutter in a vertical or slightly-inclined position; a driving device for imparting motion to the tubular cutter and adapted to permit the cutter to be readily removed from the supporting-frame, and hoisting-gear attached to the frame for raising and lowering the tubular cutter and for withdrawing the core of rock or stone formed by the cutter, all of which will be fully described by reference had to the accompanying drawings, in which—

Figure 1 is a side elevation of my improved rock-cutting machine. Fig. 2 is a plan of the same. Fig. 3 is a vertical section on the line *x x*, Figs. 1 and 2. Fig. 4 is a horizontal section on the line *y y*, Figs. 1 and 3; and Fig. 5 is an elevation of the frame with the tubular cutter removed and showing the core being removed from the rock by the hoisting device.

The frame consists of the head or top plate *a*, the ring *b*, forming the base, and the three vertical bars *c c c*, connecting the head and base together.

The cutting device is composed of a tube *d*, thickened at its lower end or having a ring *d'* secured to its lower end, said part *d'* being formed with upwardly-extending grooves for the passage of the debris due to action of the cutter. These grooves are represented by the inclined dotted lines on the cutter-head *d'* at the lower part of Fig. 1. This tubular cutter passes freely through the circular base *b* of the frame and rests on the rock, in starting, just inside said base. To its upper end is secured the central hub *e* by means of the arms *f f*, and this hub *e* has a square hole formed in it through which passes the square shaft *g*. The lower end of this shaft *g* is guided and controlled by being stepped in the plate *h*, which rests on the rock and is of a size to be held centrally by the tube *d*. The upper end of the shaft *g* is provided with a sliding coupling *i*, adapted to connect it to the shaft *j*, which is fitted to rotate in a central bearing in the head *a*, and to the upper end of this shaft *j* is secured the driving-pulley *k*. By means of this sliding coupling *i* between the shafts *g* and *j* the shaft *g* may be readily connected to shaft *j* when the tube *a* is placed in the frame in position and ready to be rotated through the medium of the shafts from the driving-pulley *k* and disconnected from the shaft *j* when it is desired to remove the tube from the frame. The frame is securely held in position by means of the bracing rods or bars *l l*, secured at one of their ends to the rock and at their other ends to the top of the frame and provided with turnbuckles for adjusting the frame as desired.

To raise and lower the tube *a*, the winch *m*, which is secured to one of the vertical bars *c* of the frame, is connected to the upper end of the tube *a* by the following means: A chain *n* from the winch is fastened to the cross-bar *o*, to the ends of which are also secured one of the ends of the two cords or wire ropes *p p*. These ropes *p p* pass over the grooved pulleys *q q*, fitted to rotate on a bracket depending from the head *a* of the frame, and the other ends of the ropes *p p* are secured to the cross-head *r*, which is fitted on the upper part of the hub *e* of the tube *a* in such a manner that said hub is free to rotate in the cross-head and that it has no vertical movement independent of the other. This hoisting apparatus is also utilized to remove the core of rock or stone after the tube *a* has been removed from the frame by securing the ends of the ropes *p p*, now detached from the cross-head *r*, to the raising-hook *s*, which is set into the top of the core, as shown at Fig. 5. It is necessary to use water with apparatus of this description. In this case it is supplied at the inte-

rior of the tube and flows down the cut made by the tube, thereby keeping its cutting edge cool, and flows upwardly on the outside of the tube, carrying with it the debris or chips formed by the cutting edge of the tube. The means here shown for guiding the driving band or rope *t* to and from the pulley *k* consists of two bent arms *u* and *u'*, fitted with bearings, so as to be rotatable on the hub of the central vertical bearing of the shaft of the pulley *k* on the head *a* and having at their other ends bearings the axes of which are coincident with tangents of the pulley *k*. In these latter bearings are fitted journals of forked arms *v v'*, said journals being axially perforated for the passage of the driving-rope. Pulleys *w w'* are carried by the forked arms and are so arranged that the axes of the journals form tangents of them. The arms *u u'* and *v v'* are adapted to be set and clamped in any position, so as to properly guide the driving-rope *t* to and from the pulley *k* whatever the direction of its travel may be. This driving-rope controlling and guiding device is covered and claimed in another application filed by me July 2, 1894, under Serial No. 516,378, so I do not claim it broadly in this application.

I claim as my invention—

1. In a rock-cutting machine, the combination of a tubular cutter, a supporting-frame, a central driving-shaft, carried at the upper end thereof, a shaft axially arranged in the tubular cutter so as to impart rotary motion thereto, a detachable operative coupling connecting the two shafts, and a bearing-plate adapted to rest on the rock and guided by the interior of the tubular cutter and to receive and guide the lower end of the cutter-shaft.

2. In a rock-cutting machine, the combination of a frame composed of a ring-base, a top plate having a central bearing and bars connecting the base and top plate together, a driving-shaft in the bearing of the top plate and provided with a pulley at its upper end, a tubular cutter held centrally in the frame and provided with a hub at its upper end, centrally perforated, and a shaft in line with and detachably connected to the driving-shaft and formed to fit the perforation of the hub of the tubular cutter so as to impart rotary motion to the tubular cutter during its longitudinal movement on said shaft.

3. In a rock-cutting machine, the combination of a frame composed of a ring-base, a top plate having a central bearing and bars connecting the base and top plate together, a driving-shaft in the bearing of the top plate and provided with a pulley at its upper end, a tubular cutter held centrally in the frame and provided with a hub at its upper end, centrally perforated, a shaft in line with and detachably connected to the driving-shaft and formed to fit the perforation of the hub of the tubular cutter so as to impart rotary motion to the tubular cutter during its longitudinal movement on said shaft, and a bearing-plate adapted to rest on the rock in the interior of the tubular cutter and to receive and guide the lower end of the cutter-shaft.

4. In a rock-cutting machine, the combination of a tubular cutter, a supporting-frame, a central driving-shaft, carried at the upper end thereof, a shaft axially arranged in the tubular cutter so as to impart rotary motion thereto, and detachably connected in line with the driving-shaft, a driving-pulley on the upper end of the driving-shaft, two adjustable arms provided with bearings, the axes of which form tangents to this pulley, two guide-pulleys, two arms carrying these pulleys and having perforated journals fitted in the bearings of the adjustable arms, the axes of these journals being coincident with tangents of the guide-pulleys, and a driving-rope passing over the guide-pulleys through the perforated journals and around the driving-pulley.

5. In a rock-cutting machine, the combination of a tubular cutter, a supporting-frame, a central driving-shaft, carried at the upper end thereof, a shaft axially arranged in the tubular cutter so as to impart rotary motion thereto, a detachable operative coupling connecting the two shafts, a cross-head attached to the upper end of the tubular cutter so as to move only in vertical directions therewith, a winch secured to the lower part of the frame, and connecting cords or chains between the winch and cross-head.

6. In a rock-cutting machine, the combination of a frame composed of a ring-base, a top plate having a central bearing and three bars connecting the base and top plate together, a driving-shaft in the bearing of the top plate and provided with a pulley at its upper end, a tubular cutter held centrally in the frame and provided with a hub at its upper end, centrally perforated, a shaft in line with and detachably connected to the driving-shaft and formed to fit the perforation of the hub of the tubular cutter so as to impart rotary motion to the tubular cutter during its longitudinal movement on said shaft, a bearing-plate adapted to rest on the rock in the interior of the tubular cutter and to receive and guide the lower end of the cutter-shaft, a winch secured to one of the frame-bars, pulleys on the under side of the head, bands or ropes from the winch passing over these pulleys, and a cross-head pivotally connected to the hub of the tubular cutter and to which the ends of the ropes from the winch are attached.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

MICHEL THONAR.

Witnesses:
GEORG BEDE,
RENI FERBISH.