

E. TALBOT.

MACHINE FOR TUNNELLING OR BORING ROCK.

No. 9,774.

Patented June 7, 1853.

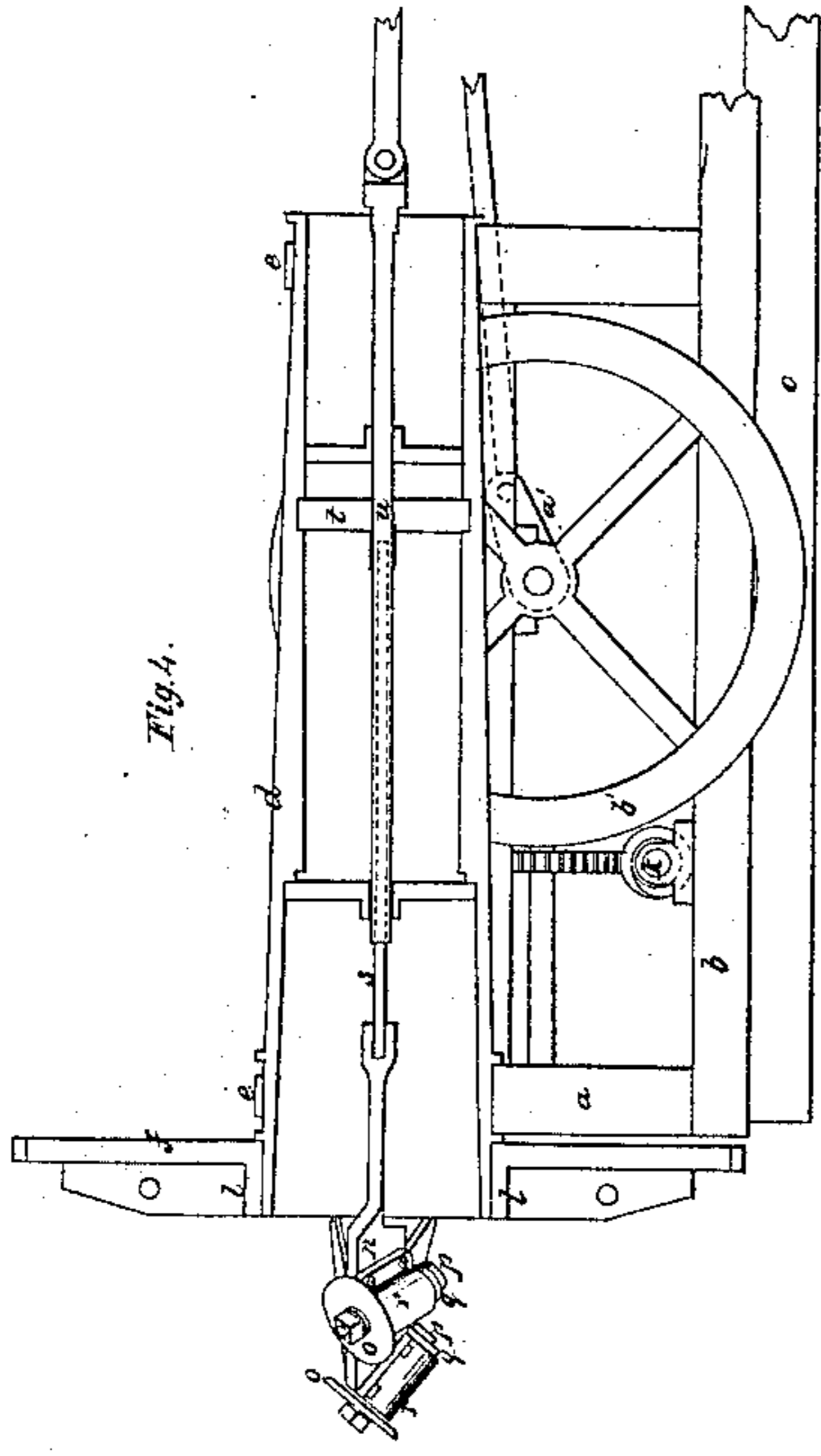


Fig. 3.

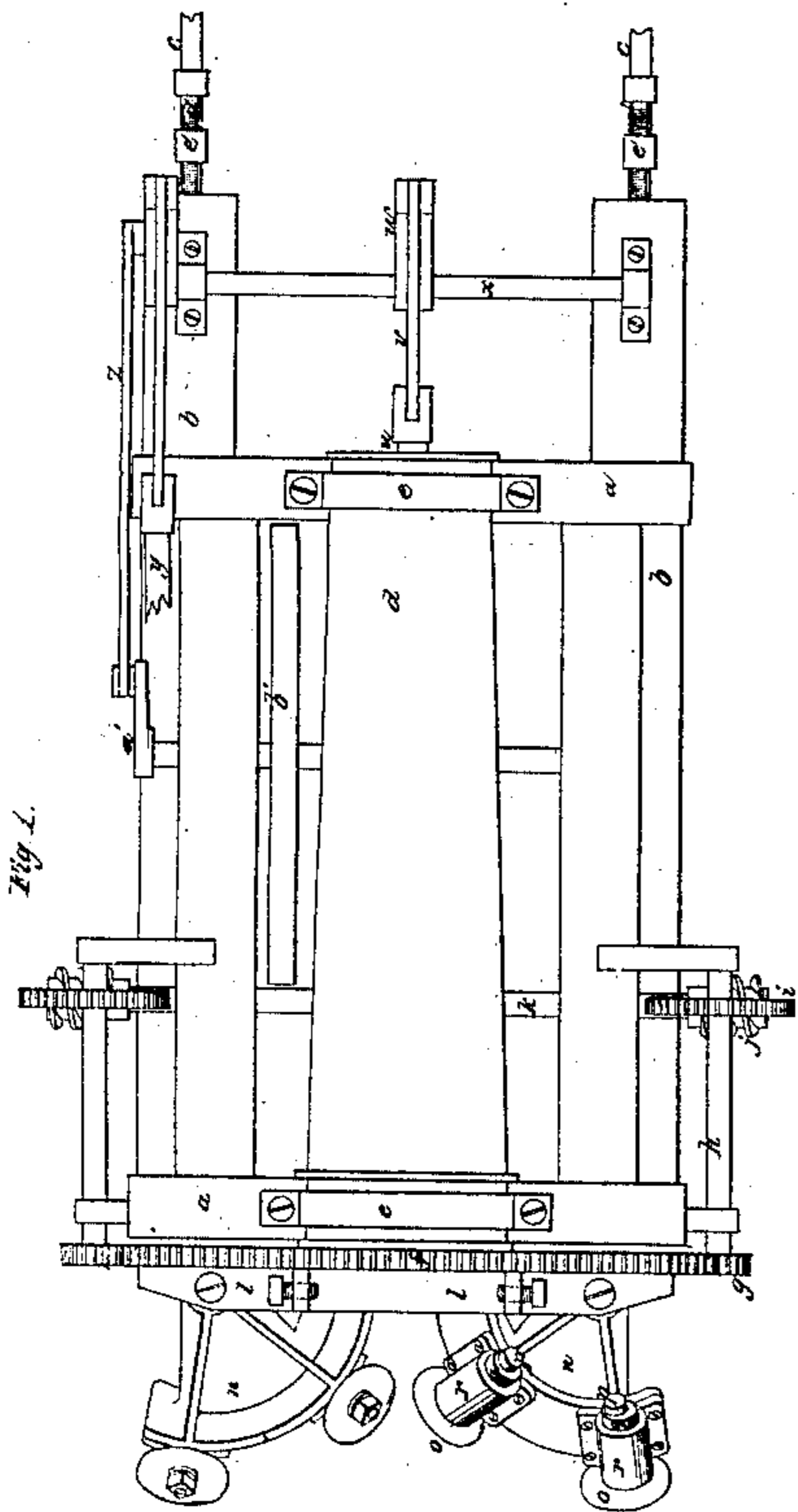
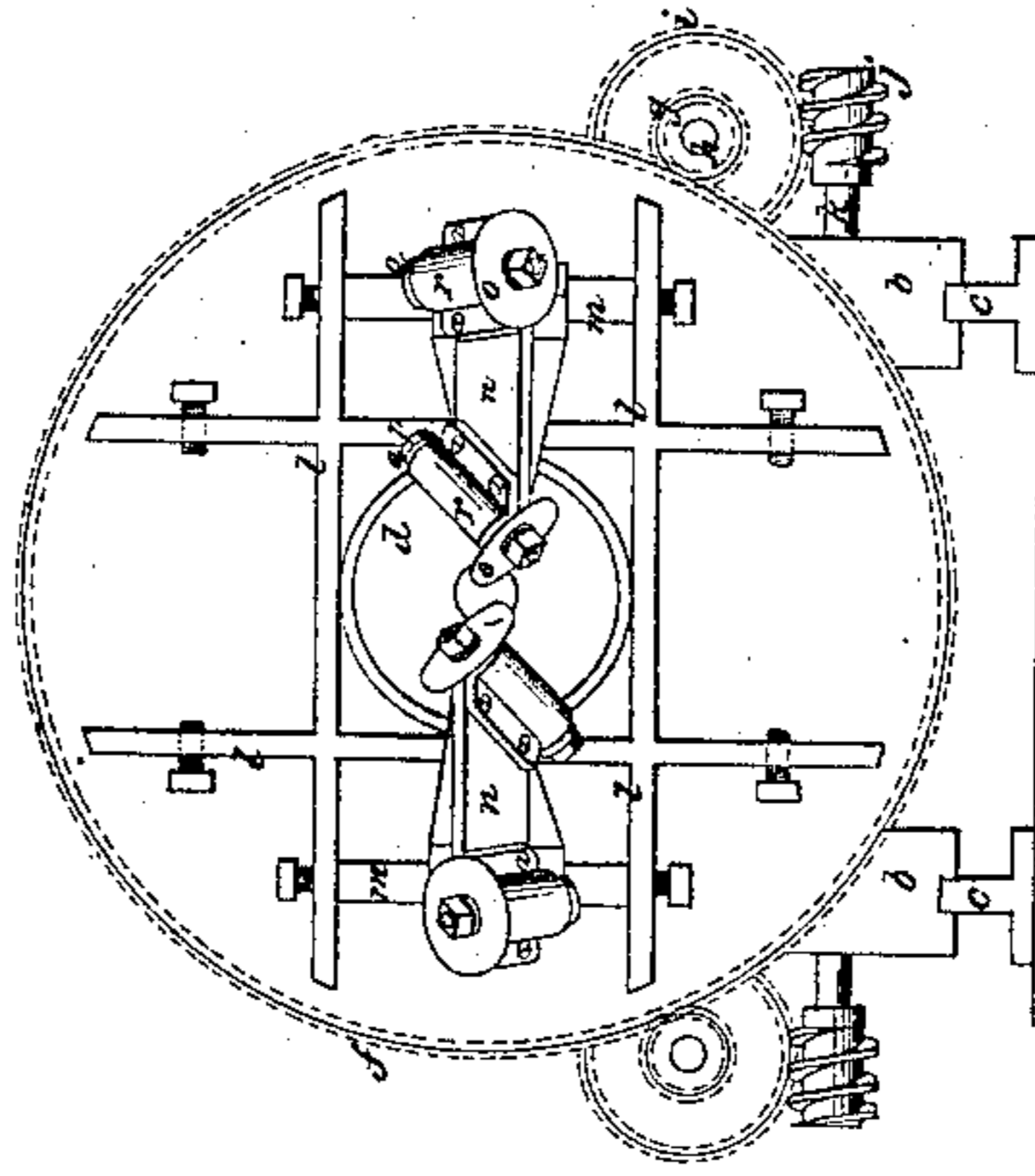
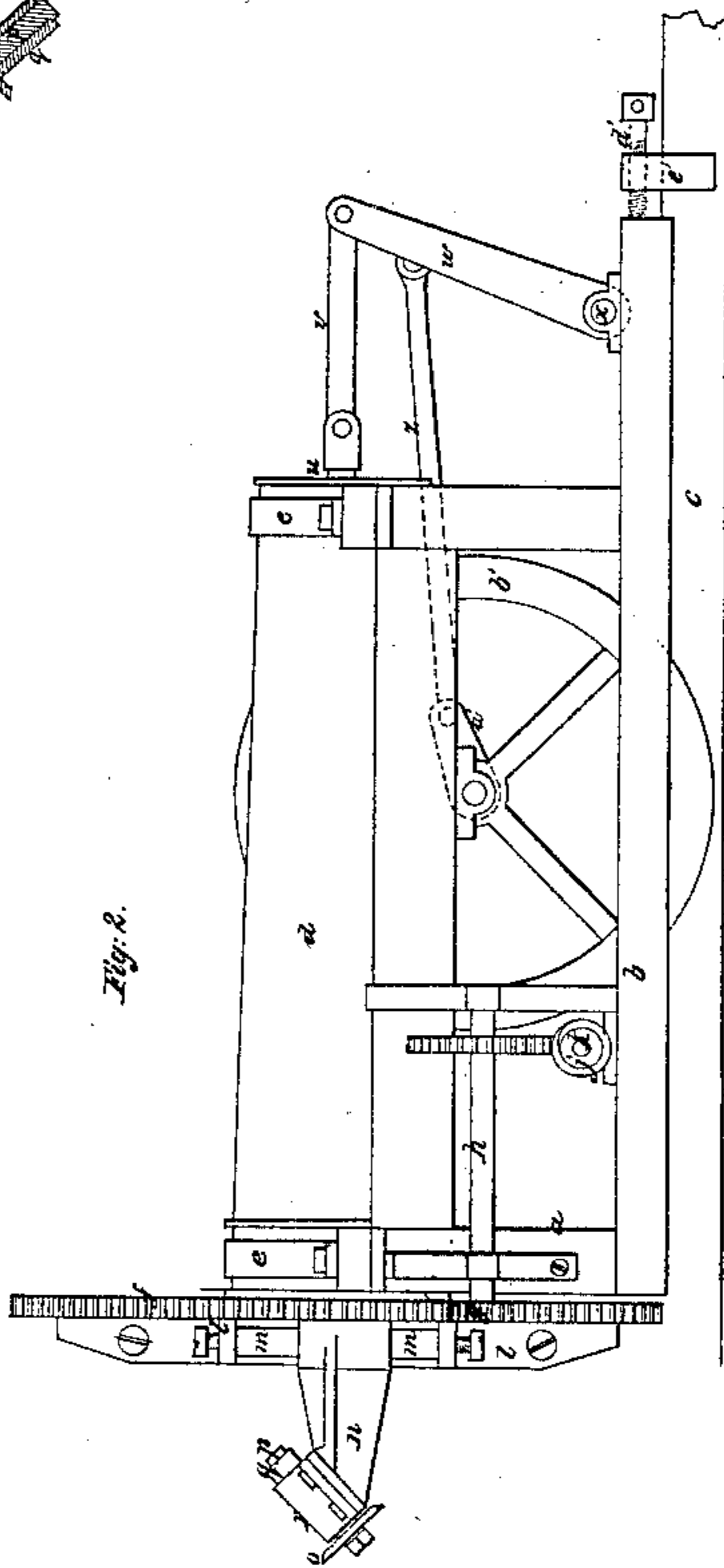


Fig. 5.



# UNITED STATES PATENT OFFICE.

EBENEZER TALBOT, OF WINDSOR, CONNECTICUT.

## MACHINE FOR BORING ROCK.

Specification of Letters Patent No. 9,774, dated June 7, 1853.

*To all whom it may concern:*

Be it known that I, EBENEZER TALBOT, of Windsor, Hartford county, Connecticut, have made a certain machine for boring or cutting into or through rock and other hard substances for the purpose of tunneling mountains and making other excavations, and that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1, is a plan of the machine; Fig. 2, a side elevation; Fig. 3, a front elevation; Fig. 4, a longitudinal vertical section; Fig. 5, a section in the line of the axis of one of the rollet cutters.

The same letters indicate like parts in all the figures.

In my said machine for boring or cutting into and through rock or other solid substances, and mainly intended for making tunnels through mountains, I employ rollet cutters such as were patented by Charles Wilson on the 13th day of March 1847, the sharp edges of which rolling against the face of the stone, &c., cut or break off certain portions thereof.

The nature of my invention consists in so employing one or more metal rollets or one or more sets of rollets with the periphery properly adapted to cut away the surface of the stone by rolling against it, that they shall describe in their action the segment of a circle from the center to the circumference of the tunnel or other perforation in combination with a slow motion around the said center of the tunnel or other aperture, whether the two said motions be continuous, intermittent or reciprocating, while at the same time the entire machine or that portion of it which carries the rollet or rollets is capable of being advanced for the feed motion in the direction of the axis of the tunnel or other aperture that is being cut.

In the accompanying drawings *a* represents the frame of the machine, the platform of which is mounted on slides *b b* fitted to and sliding on rails *c c* laid on the bottom of the tunnel as the boring progresses. These rails may be laid in any appropriate manner or instead of the rails the platform may be provided with wheels to run directly on the bottom of the tunnel or otherwise intended to move thereon.

On the frame is mounted a hollow shaft

*d* which is adapted to turn in appropriate boxes *e e* in the standard of the frame so that it can turn freely and accurately. To the forward end of this hollow shaft is properly secured a cog wheel *f*, the cogs of which are engaged by a pinion *g*, on a shaft *h* provided at the other end with a cog wheel *i* which engages a worm *j* on a transverse shaft *k*, that is to receive motion in any appropriate manner from the driving power for the purpose of giving a slow rotary motion to the wheel *f* and hollow shaft. The front face of the wheel is provided with flanches or arms *l* in which are hung two rock shafts *m, m*, which carry two sectors *n, n*, and as both are alike the description of one of them will be sufficient.

The sector *n* is provided at or near the end with two rollet cutters *o, o*, mounted on appropriate arbors *p, p*, the axis of which are at an angle of 45 degrees (more or less) with the axis of the rock shaft. The arbor of each rollet is fitted to turn freely but accurately in a tube *q*, the bore of which is eccentric to its outer periphery. This tube is in turn fitted to a box *r* on the sector so that it can be turned and moved endwise therein for the purpose of setting the rollet as may be desired, and there secured in place by a temper screw or other appropriate means. The object of this mode of adjustment (which will be made the subject of a separate patent) is to set the cutting edges of the two rollets, so that one shall, in the vibrations of the sector, describe a different track from the other, that one may cut what the other does not—and it will be obvious from the foregoing that this adjustment can be effected by turning and sliding the eccentric tubes, in which the others of the rollets turn.

The rollets are formed and operated, in cutting into the stone or other hard substances in the manner of what is known as Wilson's machine for dressing stone as before stated.

The inner ends of the two sectors are jointed to two connecting rods *s s*, which extend into the hollow shaft and which are jointed at their other end to a cross head *t* or a sliding rod *u*, which is appropriately guided in the hollow shaft as it receives a reciprocating motion by a connecting rod *v*, from the arm *w*, of a rock shaft *x*, that in turn receives motion from the piston rod *y*, of an appropriate steam engine the details

of which need not be described as the required reciprocating motion can be derived from any other appropriate mechanical agent.

5 The arm of the rock shaft which receives motion from the piston rod of the engine, is in turn connected by a rod  $z$ , with a crank  $a'$ , on the shaft of a fly wheel  $b'$ , to ease off the shocks which would otherwise be pro-  
10 duced by the strokes of the engine.

The feeding motion for turning the wheel  $f$ , which carries the cutting apparatus can be derived in any appropriate manner from the shaft of the fly wheel or from the rock  
15 shaft  $z$ , and as the means for giving such motions are numerous and well known to machinists it is deemed unnecessary to give a particular description of any one of them.

From the foregoing it will be seen that as  
20 the entire machine is advanced the rollet cutters are brought in contact with the face of the rock or other hard substance to be cut, while the vibratory or reciprocating motion given to the sectors in opposite directions  
25 causes the cutting edges of the rollets to describe each a track from the center of the wheel  $f$ , to the periphery and back again, each one describing an arc of a circle in the plane of the radii. And as the wheel  $f$ , is rotated  
30 with a slow motion a series of cuts will be made by the periphery of the cutters which will be nearly in the direction of the radii gradually shifting around the entire circle, and so on in succession, the entire machine  
35 being moved forward by any desired means to keep the cutters against the face of the stone. And although I have described the machine with two sectors and two rollets on each sector it will be obvious that it can  
40 be made with only one or with more than two, and each sector with one or more rollets.

I do not wish to confine myself to the use of vibrating sectors for operating the rollets, as it will be obvious that the rollets

can be connected with the periphery of a  
45 wheel or wheels having a continuous rotary motion imparted by cog wheels or their equivalents by means of a shaft passing the hollow shaft  $f$ , or by any other suitable  
50 means. And as to the mode of rotating the cutting apparatus about the center of the tunnel or other aperture to make the series of cuts it will be obvious that this can be done by a continuous or intermittent mo-  
55 tion in one and the same direction, or reciprocating. And finally—as to the progressive motion of the entire cutting apparatus in the direction of the axis of the tunnel or excavation, to keep the cutters against the  
60 face to be cut, it can be continuous or intermittent, and may be communicated in various ways such for instance as screws  $d'$ ,  $d'$ , tapped in standards  $e'$ ,  $e'$ , secured to the bottom of the tunnel and acting against the  
65 end of the frame, or by means of levers acting against the frame, and abutting against some solid part of the tunnel.

What I claim as my invention and desire to secure by Letters Patent is—

The method substantially as herein de-  
70 scribed of applying a rollet cutter or cutters for boring or excavating tunnels and other apertures in rocks or other hard substances, by causing the said rollet cutter or cutters,  
75 or sets of rollet cutters to cut segments of circles from the center or near the center to the periphery of the tunnel or other excavation, with the concavity toward the ma-  
80 chine, in combination with a motion or motions around the center of said tunnel, to cause the said cutter or cutters to act in succession on the entire surface to be cut away, substantially as described.

EBENEZER TALBOT.

Witnesses:

G. W. SAYLES,  
JOSEPH WHIPPLE.