

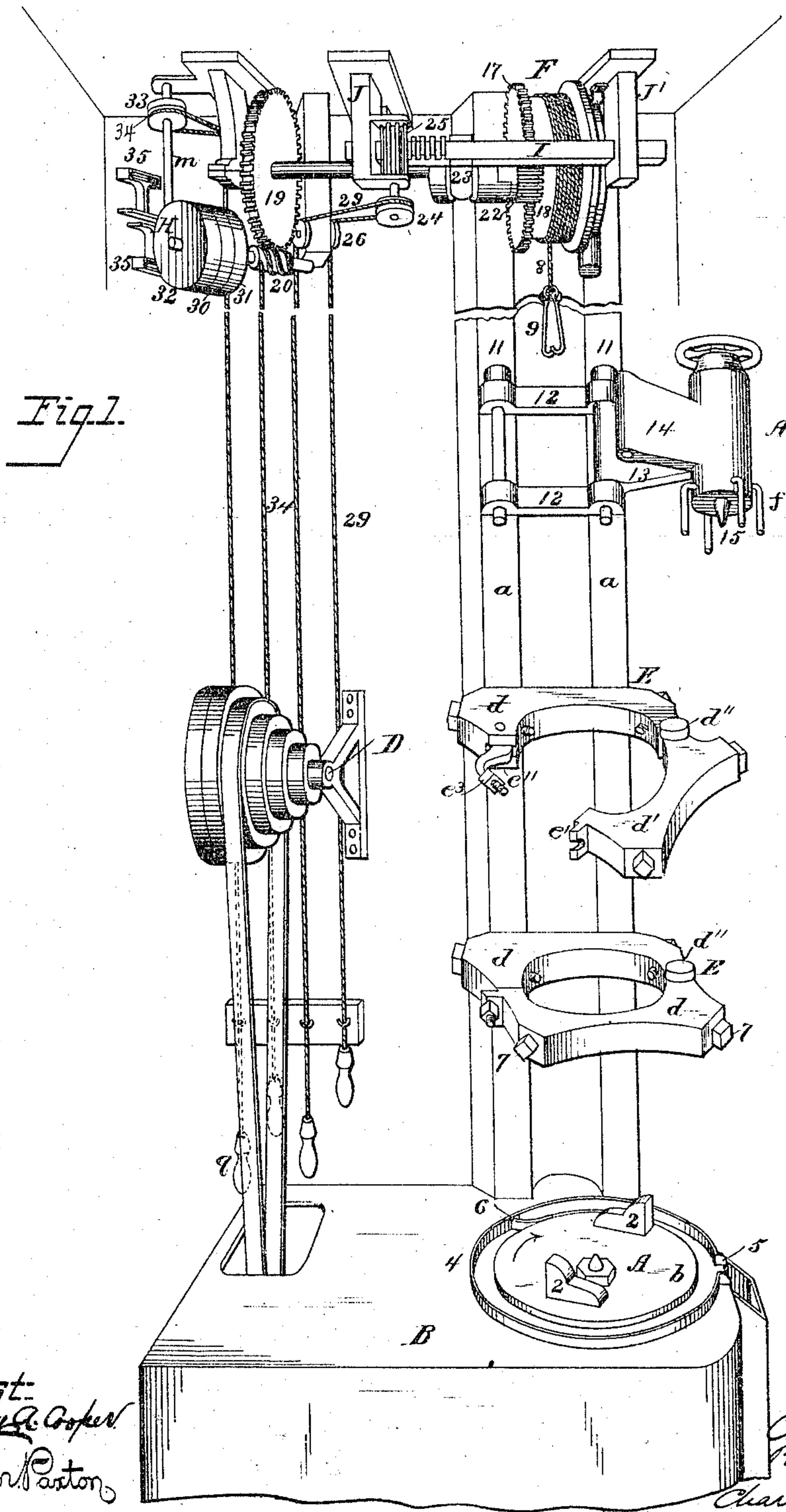
(No Model.)

3 Sheets—Sheet 1.

C. R. OTIS.  
BORING MACHINE.

No. 257,374

Patented May 2, 1882.



Attest:  
*Courtney R. Cooper*  
*William Barton*

*Chas. R. Otis*  
*By his atty*  
*Charles E. Foster*

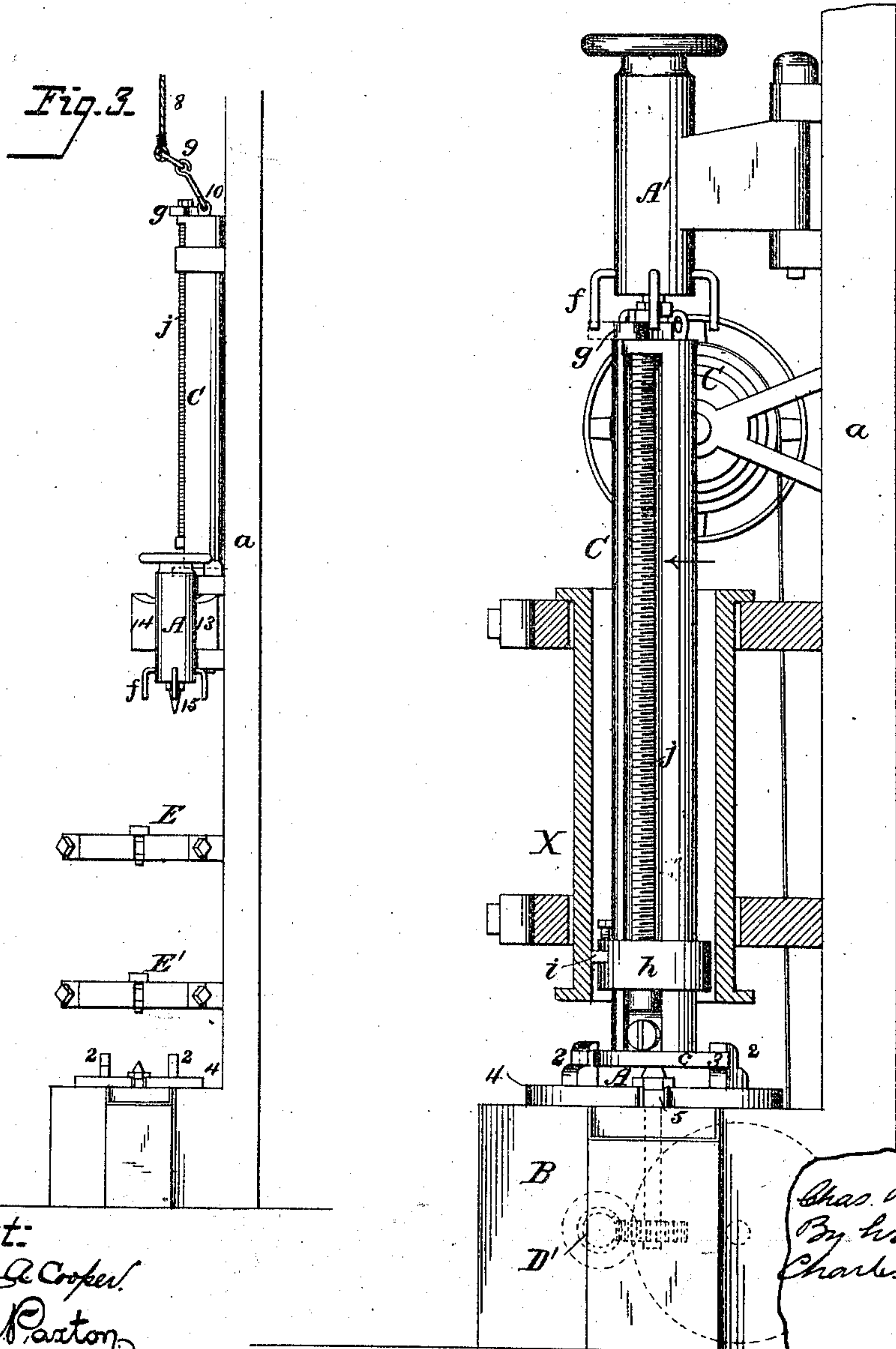
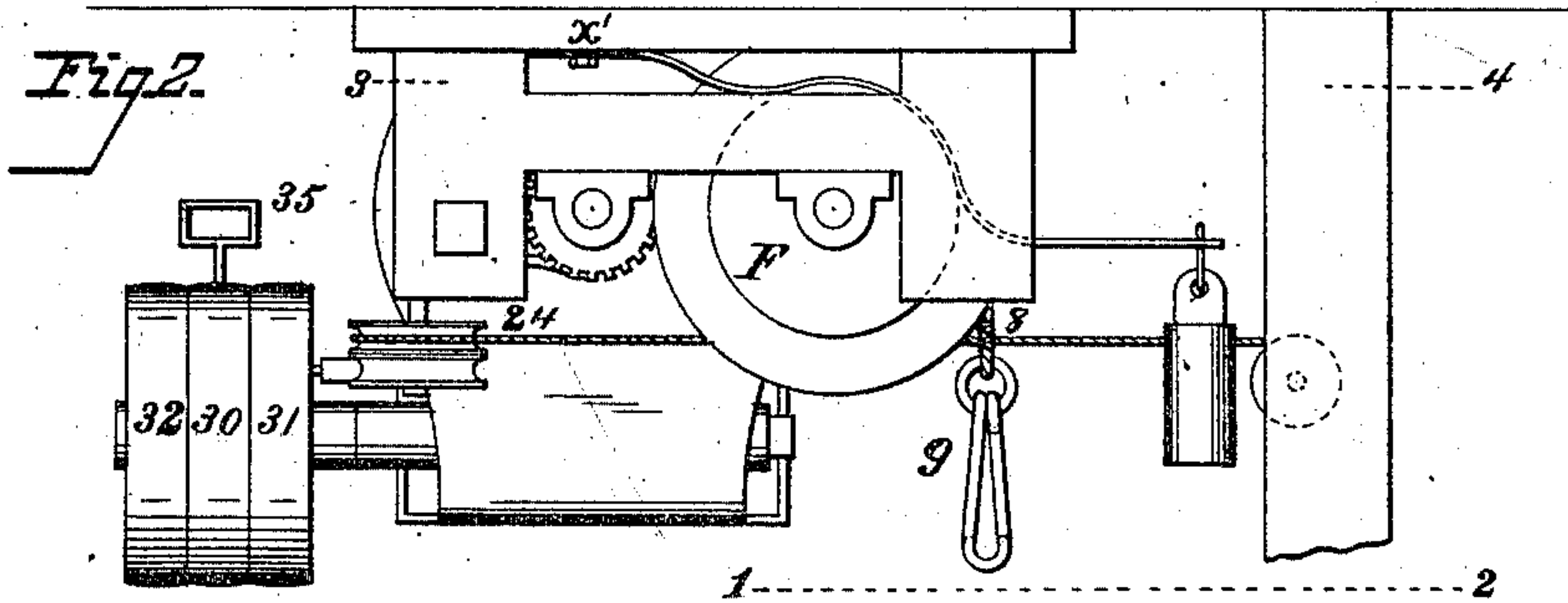
(No Model.)

3 Sheets—Sheet 2:

C. R. OTIS.  
BORING MACHINE.

No. 257,374.

Patented May 2, 1882.



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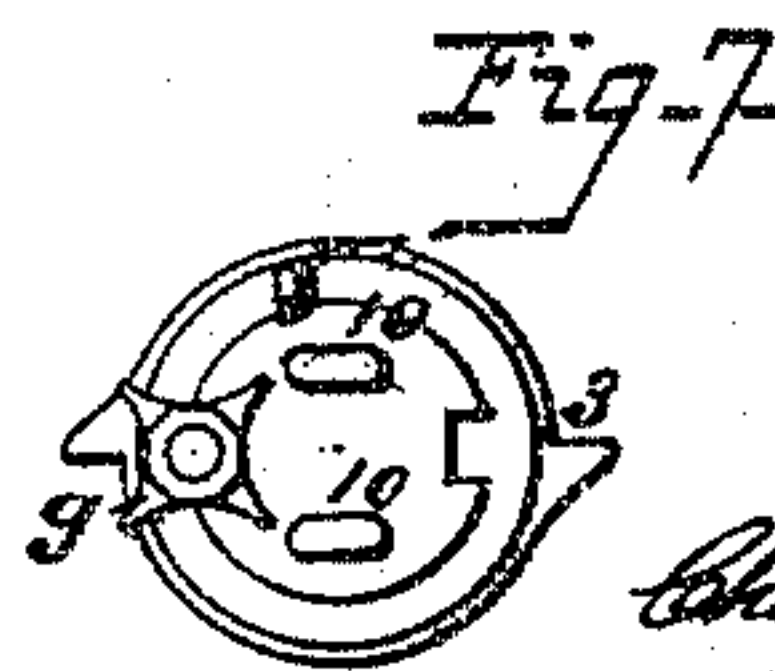
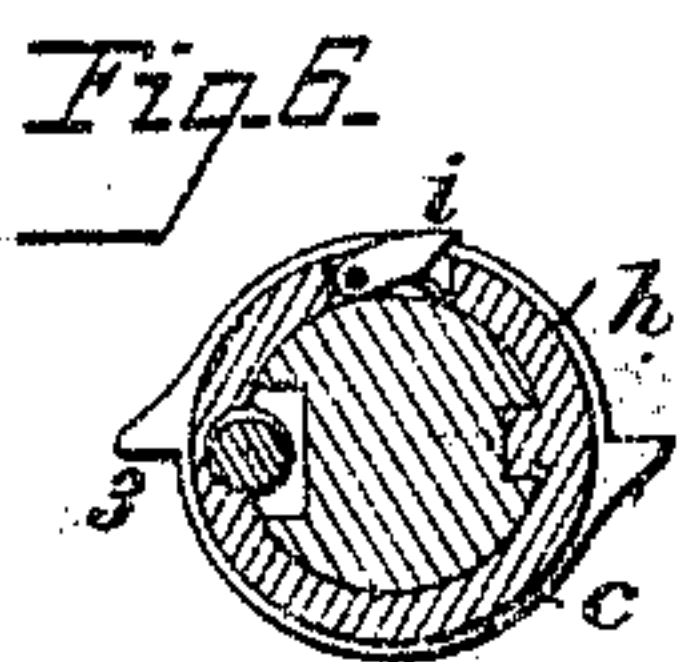
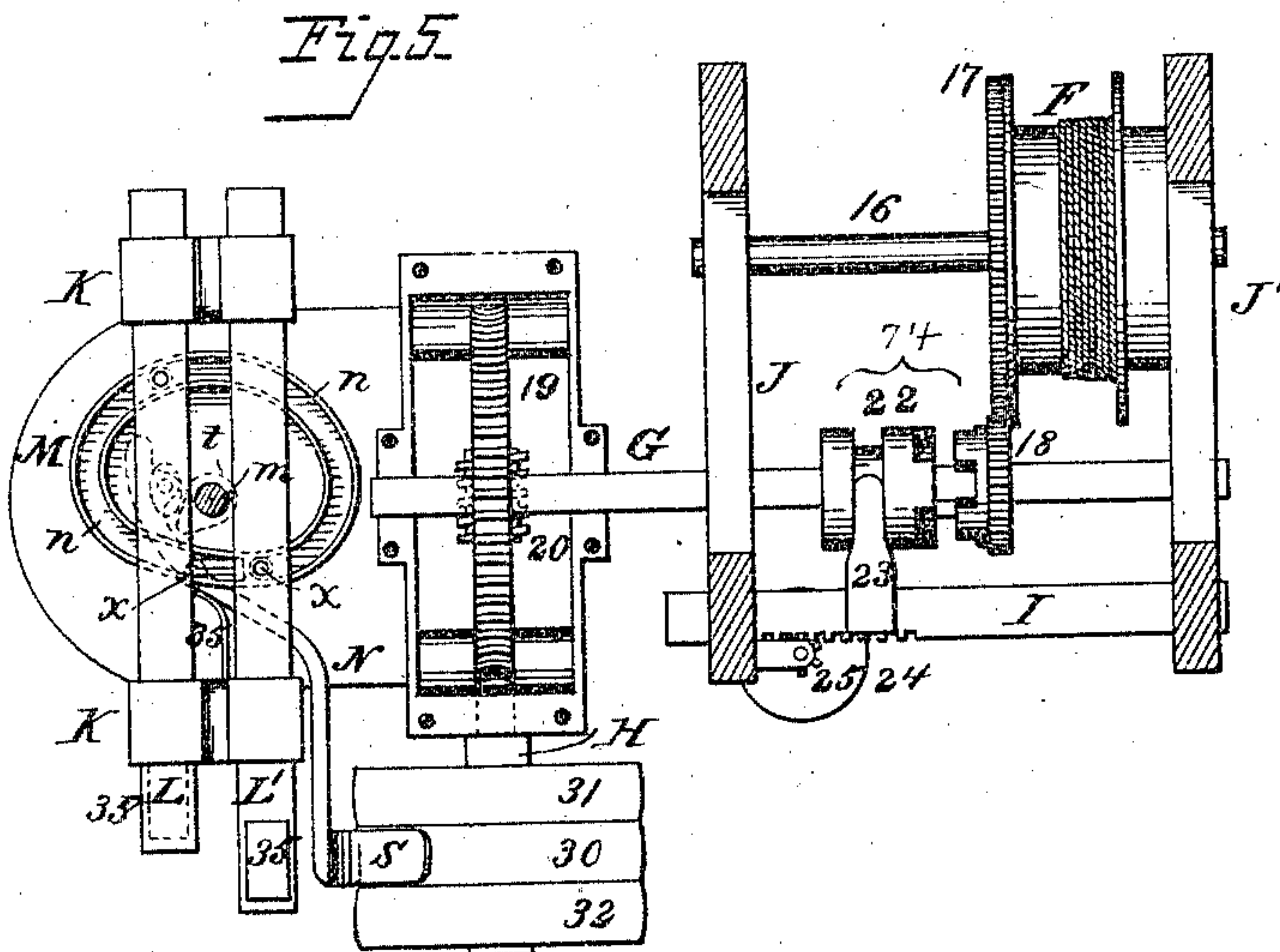
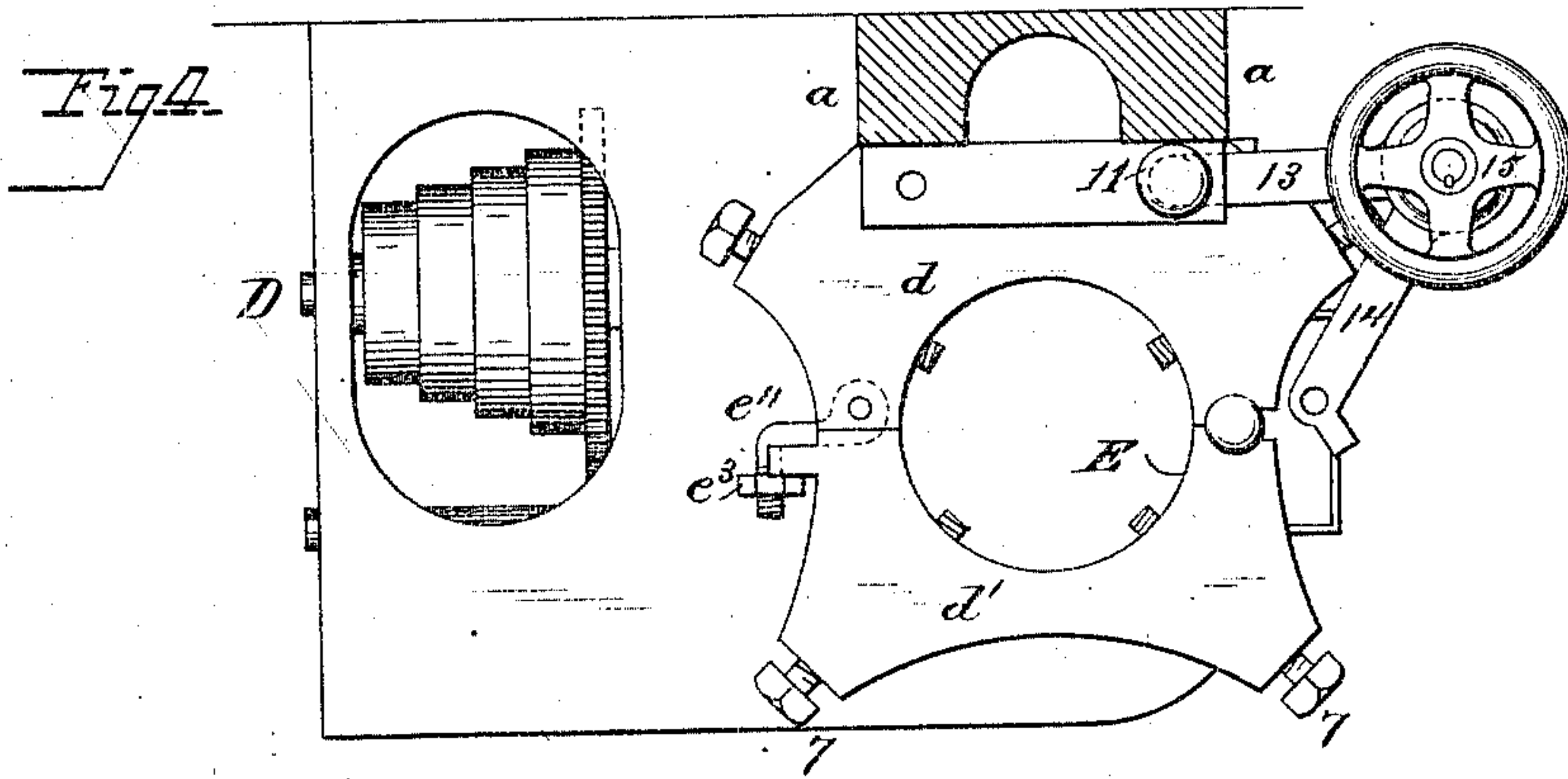
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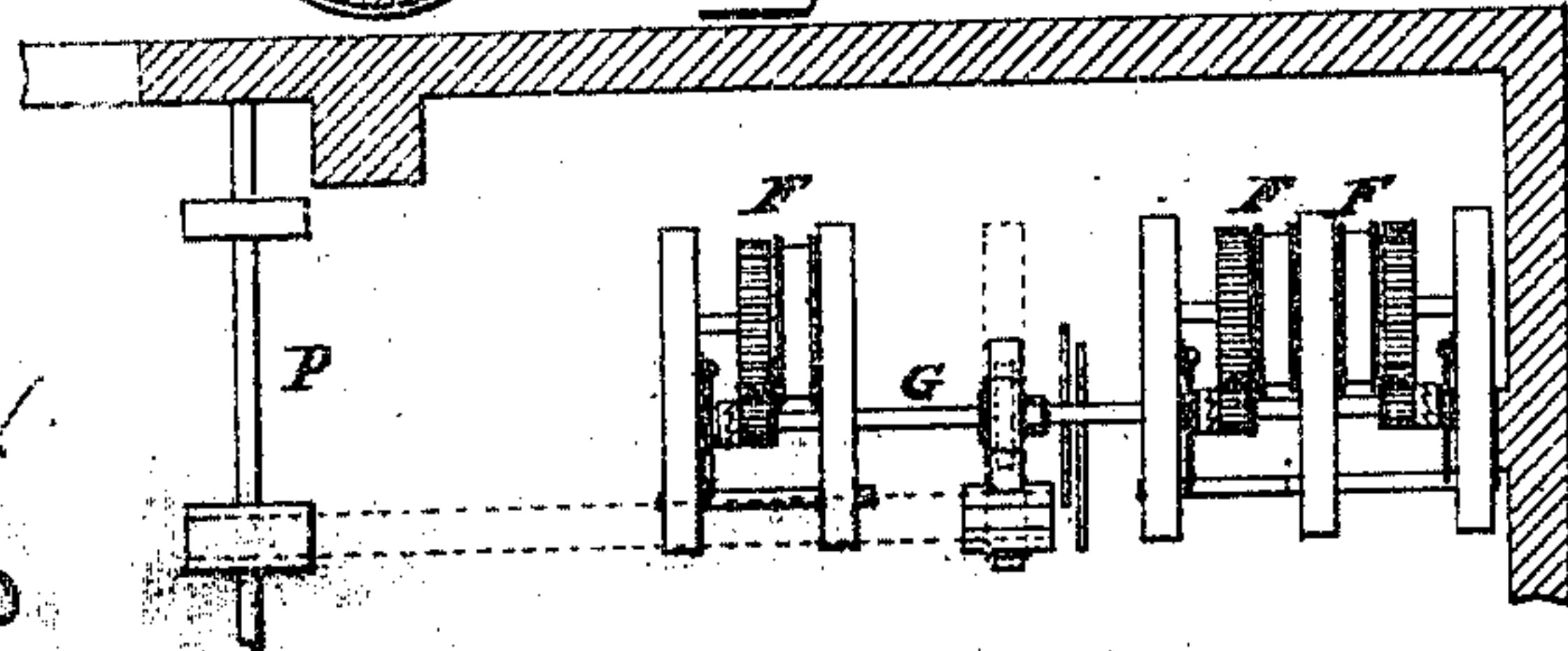
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*Fig. 8.*



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# UNITED STATES PATENT OFFICE.

CHARLES R. OTIS, OF YONKERS, NEW YORK.

## BORING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 257,374, dated May 9 1882.

Application filed November 11, 1881. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES R. OTIS, of the city of Yonkers, Westchester county, New York, have invented an Apparatus for Boring and Manipulating Cylinders, of which the following is a specification.

My invention relates to that class of apparatus used for boring cylinders or pipes; and it consists in the construction and arrangement of parts hereinafter fully described, whereby the placing and removal of the cylinders and boring-bar, the adjustment of the various parts, and the starting and stopping of the apparatus may be effected with the least loss of time and with the greatest facility. The further purpose and result is to secure precision in the operations.

In the drawings, Figure 1 is a perspective view of the apparatus. Fig. 2 is a side elevation in section; Fig. 3, a side elevation, reduced scale; Fig. 4, a sectional plan on the line 1 2, Fig. 2; Fig. 5, a plan on the line 3 4, Fig. 2; Fig. 6, a section of the boring-bar; Fig. 7, an end view of the boring-bar; Fig. 8, a plan showing the arrangement when two or more boring apparatus are used together.

The general arrangement of the apparatus is vertical, there being a head-stock, A, arranged with its face-plate *b* horizontal, and revolved above a bench, B, an adjustable or swinging tail-stock, A', secured to vertical shears *a a*, so as to be brought into line with the head-stock above the same, and a removable boring-bar, C, turning on the centers of the stocks when in operation.

The face-plate *b* carries two lugs, 2 2, arranged each to bear on a shoulder, 3, of a ring, *c*, on the lower end of the boring-bar. Thus as the face-plate revolves in the direction of the arrow it turns the boring-bar with it.

The head-stock spindle is driven from a shaft, D, through the medium of any suitable appliances arranged within the bench B, and the face-plate is surrounded by a flange, 4, broken at one point, 5, where the chips are discharged by means of an inclined vane, 6, projecting from the edge of the face-plate.

To the shears are secured clamps E E', each consisting of a jaw, *d*, secured fixedly or adjustably to the shears *a a*, and a movable jaw, *d'*, pivoted at one side to the jaw *d* by a pin, *d*<sup>2</sup>. A bent arm, *e*<sup>2</sup>, is pivoted to the other side, and constructed to be swung into a notch in a lip, *e'*, on the other jaw, and is there held by

screwing a nut, *e*<sup>3</sup>, against said lip. The jaws, when thus held together, present a circular opening for the reception of the cylinder or tube X to be bored, and radial set-screws 7, passing through the jaws and bearing with their inner ends upon the cylinder, precisely center and retain the latter steady while being bored. Such clamps may be opened to receive laterally tubes or cylinders with flanges of too great width to permit a longitudinal introduction, and by the act of closing at once center and secure the cylinder in its position between the stocks.

The boring-bar is raised and lowered by means of a rope, 8, and drum or windlass F, the rope being provided with grapples 9, adapted to eyes 10 on the upper end of the bar, the lower end of which is centrally socketed to receive the spindle of the lower stock.

The tail-stock is hung at one side by a vertical pin, 11, passing through holes in parallel cross-pieces 12 on the shears, and through one bracket, 13, of the stock, the other bracket, 14, being perforated for the passage of another pin, by which it may be locked in place, when the spindle 15 of the tail-stock will be directly in line with that of the head-stock. The tail-stock on removing either pin 11 may be swung on the other to one side, out of the way, to permit the introduction or withdrawal of the boring-bar, and when the latter is not in use it may be swung by its hoisting-rope between the shears *a a*, and deposited with its end bearing on the upper cross-bar, 12, as a seat, as shown in Fig. 3.

From the tail-stock extend downward fingers *f*, arranged to be struck by a star-wheel, *g*, on the end of a feeding-screw, *j*, turning in bearings of the cutter-bar, and carrying a ring, *h*, in which is inserted a spring-cutter, *i*, arranged to bite into the metal when the bar turns in the direction of the arrow, Figs. 2 and 6, but yielding when the motion is reversed. As the arms of the wheel *g* strike the fingers *f* the screw is turned and the ring and cutter carried upward, (or downward,) gradually feeding the cutter *i* longitudinally as it is also carried round within the cylinder; but should the motion of the parts be accidentally reversed the cutter will, without breaking, move without cutting within the cylinder.

The drum F may be turned in any convenient manner to raise and lower the cutter-bar, as well as for carrying the cylinder into the



jaws and removing them. I have shown in the drawings a most convenient arrangement, the drum being mounted on a shaft, 16, having its bearings in suitable hangers, J J, and provided with a toothed wheel, 17, gearing with a pinion, 18, of a clutch, 74, on a shaft, G, carrying a worm-wheel, 19, gearing with a worm, 20, on a driving-shaft, H, turning in suitable hangers.

10 The sliding section 22 of the clutch is carried by arms 23 on a bar, I, sliding in the hangers J J, and in bearings on the hanger J turns a shaft carrying a pulley, 24, and a pinion, 25, which gears with the rack on the bar I. A cord, 29, (passing round the pulley 24 and guide-pulleys 26 26,) extends at each end down to a point near the bench B, where it is provided with handles. By pulling the ends of the cord the pinion 25 may be turned to throw the rack-bar I in one direction or the other, so as to throw the clutch into or out of gear, this being effected by the workman at the table B, or by one on any one of the floors through which the cord may pass.

25 It is essential to the expeditious operation of the device that the drum F be quickly arrested, reversed, and started, for which purpose I use the reversing appliances shown in Figs. 1 and 5.

30 The driving-shaft H is provided with a fixed pulley, 30, and two idlers, 31 32, and a bracket, K, supports two shifter-bars, L L', carrying belt-guides 35.

A vertical shaft, *m*, carries a cam-wheel, M, into the irregular groove *n* of which enters studs *x* on the shifter-bars, as shown in Fig. 5.

The cam-wheel is so constructed that by turning the same one bar will be thrown outward or inward a little ahead of the other, and 40 the belts are shifted, the one from and the other upon the driving-pulley, to reverse the motion of the drum and raise or lower the load. As one belt is removed from the driver before the other comes upon it, time is allowed for the application of the brake hereinafter described. The reversal is effected from the 45 lower or intermediate floors by a rope, 34, passing around a pulley, 33, on the shaft *m*, over guide-pulleys, and downward through the floors, to a position adjacent to the bench B, where it is provided with handles *q*, so that the workman at the bench, by pulling the ends of the ropes 29 34, can stop or start the drum F in either direction or reverse its motion while 50 running.

To prevent the continued rotation of the drum by momentum, when a belt is thrown upon its idler-pulley, I use a brake-lever, N, provided with a shoe, *s*, arranged to bear on the driving-pulley 30, the lever being pivoted to the bracket K at *x'*, and its inner end bearing on a cam-projection, *t*, so arranged on the shaft *m* as to bear on the lever and press the shoe *s* against the driving-pulley at the moment the 65 belt passes onto the idler-pulley, a spring, 85, retracting the lever as the cam *t* is carried farther round.

The apparatus above described may be one of a series which may be in simultaneous operation, in which case the general arrangement will be such as shown in the plan, Fig. 8, in which P is the main driving-shaft, and the shaft G drives a series of drums, F, each arranged above or adjacent to pairs of jaws and operating in connection with a rotating 75 head-stock and movable tail-stock, as above described, any one of the drums being thrown into or out of operation by clutch mechanism, as before, independent of the other clutch devices. 80

The clutch and elevating devices may be of different constructions, and the tail-stocks may be arranged to slide to one side instead of being hinged. Differently-constructed clamps and centering devices may also be used; but 85 in any case the general operations will be the same, and the tubes or cylinders can be adjusted with precision and set in place, removed, and accurately bored with a celerity that is unattainable by ordinary mechanism. 90

It will be seen that by the use of a sufficient number of clamps extremely long tubes or a series of tube-sections bolted together may be bored at once.

I claim—

1. In a boring apparatus, the combination, 95 with a vertical bed or shears, of a rotating head-stock, tail-stock capable of lateral adjustment to carry it out of line with the head-stock, and elevating mechanism constructed 100 and arranged to raise and lower the cylinder and boring-bar, substantially as set forth.

2. The combination, with the tail-stock, of the fingers *f*, arranged to be struck by the star-wheel on the screw of the boring-bar, substantially as set forth. 105

3. The combination, with the bench and head-stock, of a flange, 4, and vane 6, substantially as set forth.

4. The combination of the head and tail 110 stocks, arranged vertically, the hoisting mechanism, driving-shaft, clutch device for throwing said mechanism into and out of operation, and appliances extending to the bench, whereby the clutch may be operated, substantially 115 as set forth.

5. The combination, with the hoisting-drum, driving-shaft, and driving and idler pulleys, of the shifting devices and appliances extending to the bench B, constructed to shift both belts, 120 one ahead of the other, substantially as set forth.

6. The combination, with the shaft *m* and cam-wheel M, of the shifting-bars and the rope 34, passing around a pulley on the shaft and 125 extending to the bench B, substantially as set forth.

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

CHAS. R. OTIS.

Witnesses:

M. M. VAIL,  
FRANK VARIAN.