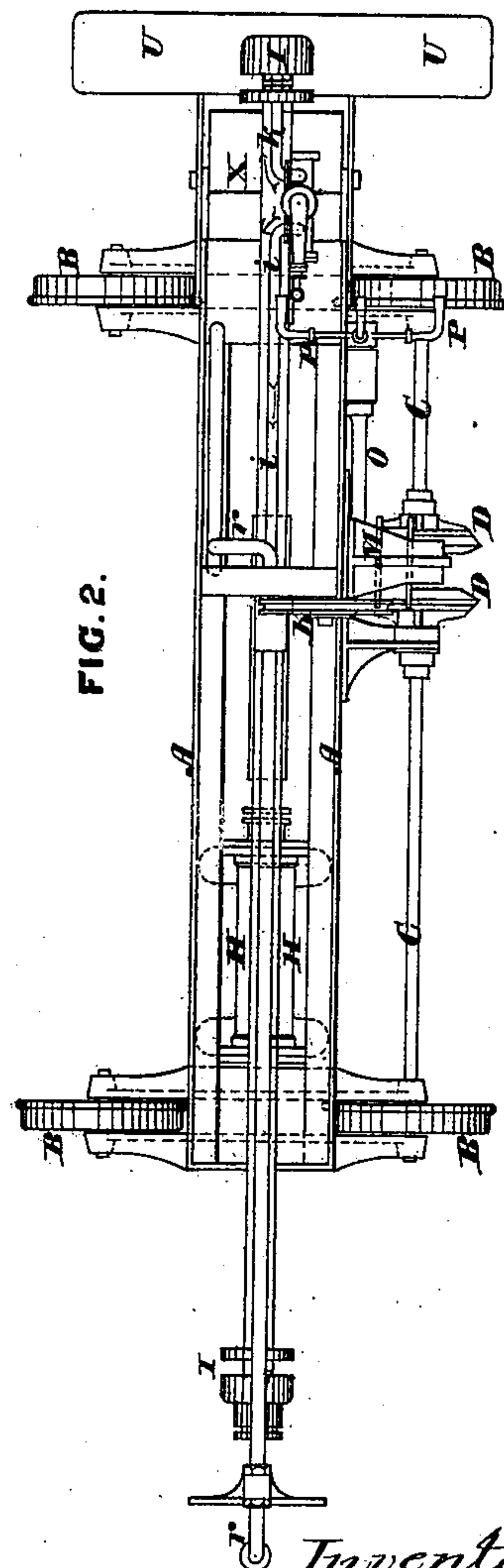
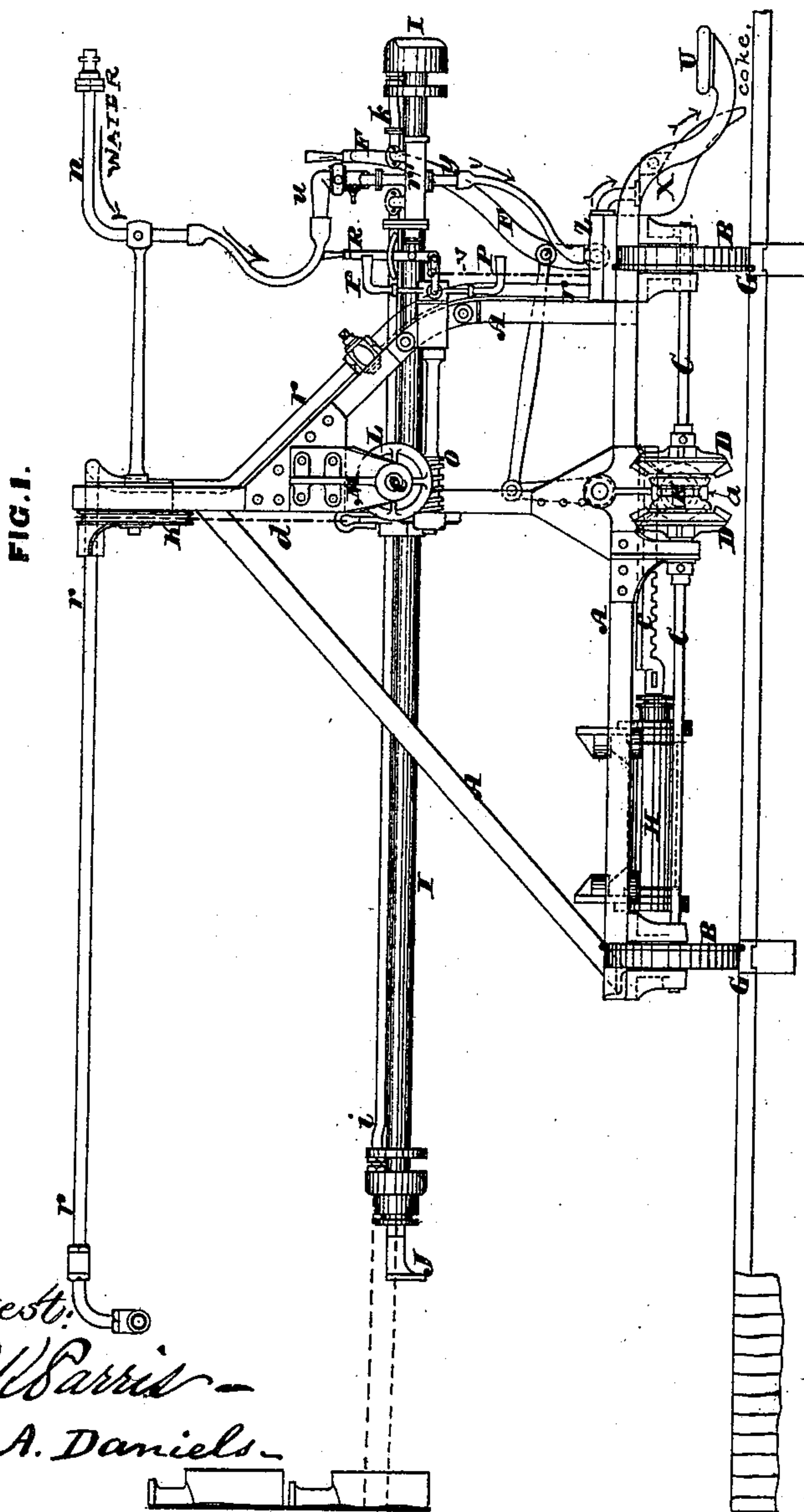
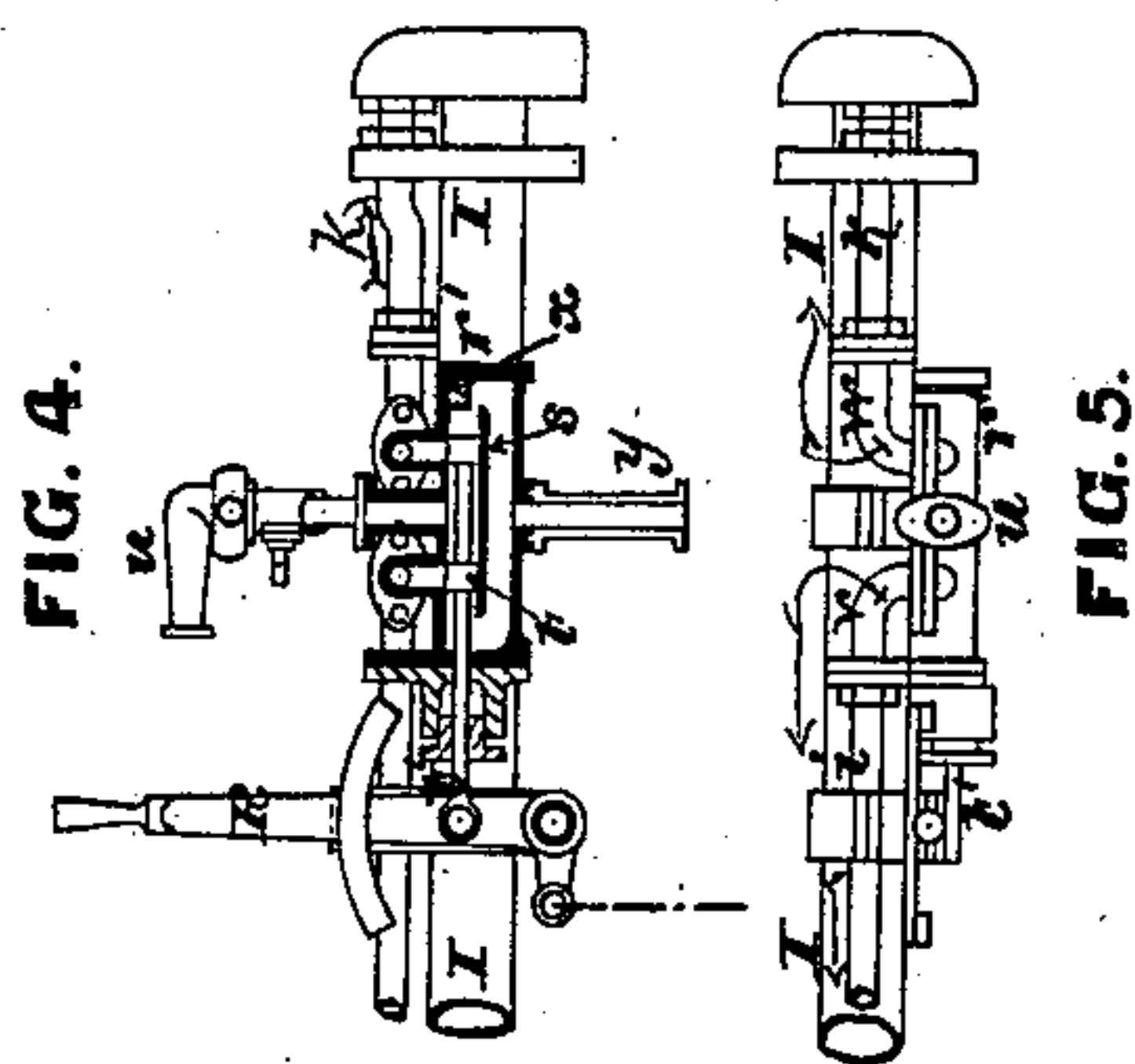
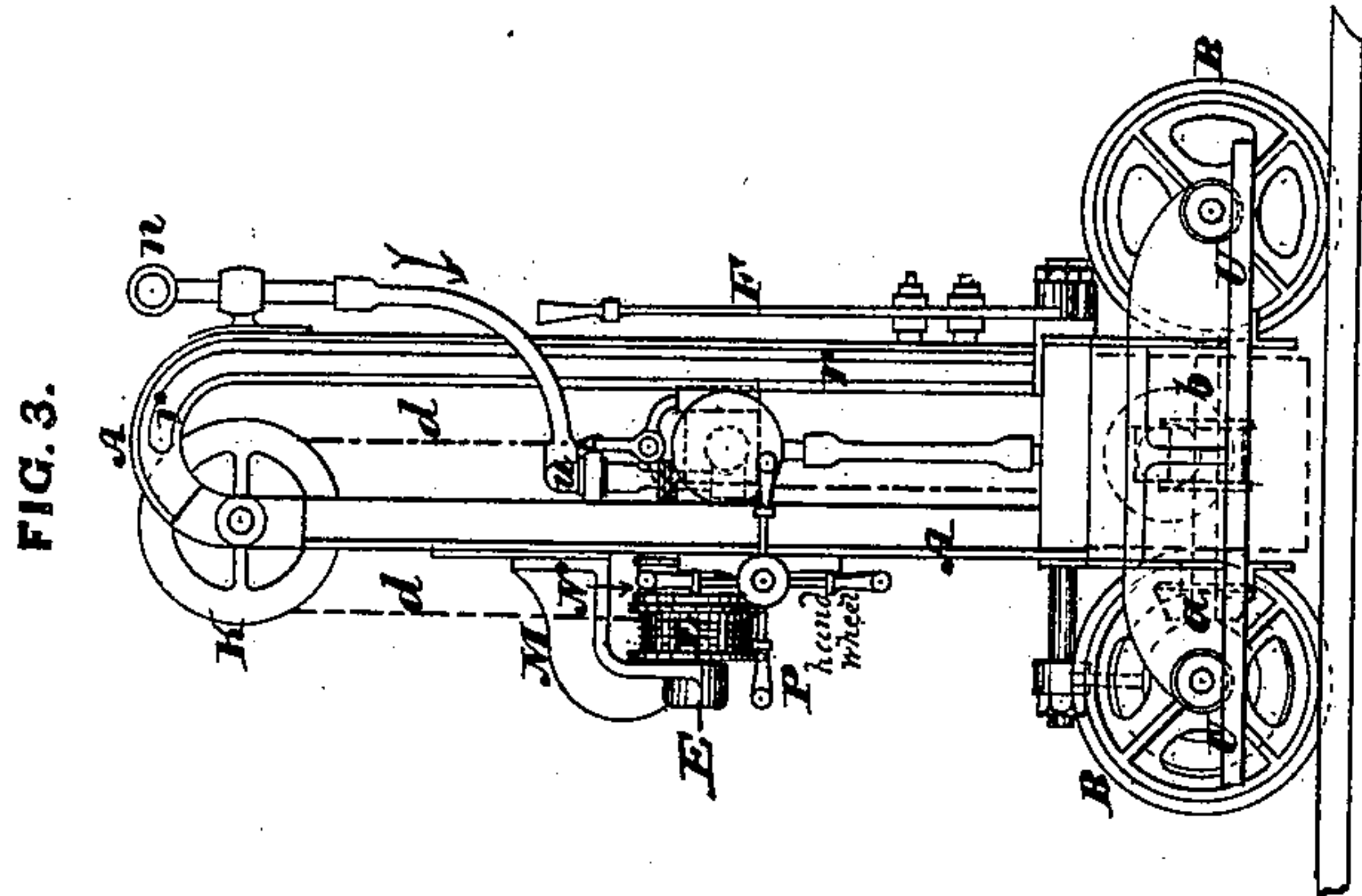


W. FOULIS.

APPARATUS FOR DRAWING RETORTS.

No. 177,327.

Patented May 16, 1876.



Attest:  
*W. Barris*  
 H. A. Daniels

Inventor:  
 Wm Foulis by  
*C. S. Whitman*



# UNITED STATES PATENT OFFICE.

WILLIAM FOULIS, OF GLASGOW, NORTH BRITAIN.

## IMPROVEMENT IN APPARATUS FOR DRAWING RETORTS.

Specification forming part of Letters Patent No. **177,327**, dated May 16, 1876; application filed September 1, 1875.

*To all whom it may concern:*

Be it known that I, WILLIAM FOULIS, of Glasgow, in the county of Lanark, North Britain, civil engineer, have invented Improvements in Drawing Retorts and in the Machinery or Apparatus employed therefor, of which the following is a specification:

My invention relates to that class of machines which are made use of for drawing the charges from gas-retorts; and the nature thereof consists in certain improvements in the construction of the same, and novel combinations of parts, hereinafter shown and described.

On the sheet of drawings hereunto appended, Figure 1 is a side elevation, Fig. 2 a plan, and Fig. 3 an elevation, of the rear end of the retort-drawing machine, as constructed in accordance with my said improvements.

As shown by these figures, the apparatus consists of a framing, A, carried on wheels B, a pair of which are placed on the same shaft or axis C, on which are also situated, loosely, two bevel-wheels, D, and a clutch, E, which slides on a feather on the shaft C, and is alternately geared with the clutch-boxes of the bevel-wheels D, by operating the lever F. A bevel-pinion, *a*, placed on a cross-shaft, *b*, is geared with the bevel-wheels D, and the pinion *a* is caused to traverse the machine along the rails G, and in front of the retorts, by means of the hydraulic cylinder H and rack *c*, which latter gears into a spur-pinion placed on the shaft *b*. By placing two bevel-wheels, D, on the shaft C, and alternately gearing them to the said shaft by clutch mechanism of a well-known class, both strokes of the piston of the hydraulic cylinder H may be utilized in traversing the drawing-machine continuously in the same direction. The hydraulic cylinder I, to the rod of which the rake J is attached, is suspended from one end of a chain, *d*, as shown. From the cylinder the chain passes upward, over a pulley, K, situate at the upper end of the framing A, and thence to a drum, L, to which it is attached, on a shaft, *e*, carried by the framing A, and by a bracket, M. The chain is wound on or unwound from the drum L accordingly as it is desired to raise or lower the drawing mechanism to the level of any retort in a series, by actuating the tangent-

screw O, gearing into the worm-wheel N on the shaft *e*. The tangent-screw O is rotated by a hand-wheel or by spokes placed on the screw-shaft at P. At the rearward end of the hydraulic cylinder I a double piston-valve is placed, as shown at Figs. 1, 2, and 3, the valve being also illustrated in detail, partly in longitudinal section and partly in side elevation, at Fig. 4, and in plan at Fig. 5, of the drawings.

As shown by these figures, the valve arrangement consists of a chest, *r'*, formed on or attached to the rake-cylinder I, and divided longitudinally by a diaphragm or web, *s*. In the upper compartment of the chest *r'* the double piston-valve *t* is placed, and the outer end of the valve-spindle *t'* is connected to a lever, R, as shown. The branch *u* communicates with the pipe *n*, through which water under pressure is conducted to the retort-drawing apparatus, and the branches *v* and *w* of the valve-chest communicate with the pipes *i* and *k* leading to the forward and backward ends, respectively, of the cylinder I.

By operating the lever R toward the front or rear of the machine, the piston-valve *t* is brought into position to supply water under pressure through the branches *v* and *w* and pipes *i* *k* to either the forward or rear end of the cylinder I, it being understood that into whichever end of the cylinder I the water is being passed, water is exhausting or passing out from the opposite end through the ports *x*, which communicate with the lower chamber of the chest *r'*, from whence the water passes off through the branch *y* into the box or chamber Z, and is discharged therefrom either through the spout X, or it may be conducted through the pipe *r*, and discharged from the front end thereof onto the material (coke) drawn from the retorts, and so damp out the heat from them. The lever R is formed with a short arm, to which one end of a chain, V, is attached, the opposite end whereof is fixed to the framing A of the machine, or it may be carried round a pulley supported in the framing, and attached to the cylinder I. By this means when the lever R is moved backward so as to admit water to the rearward end of the cylinder I, and so push the rake J into the retort, the rearward end of



the cylinder is at the same time depressed, so that the rake in moving forward enters the retort above the charge of material contained therein. Similarly when the lever R is moved forward the rearward end of the cylinder I is elevated, thereby lowering the rake J into the material, and water being at the same time admitted to the forward end of the cylinder through the pipe *i*, the rake J, together with the charge of the material, is withdrawn from the retort. Water under pressure is admitted to the forward and rearward ends of the cylinder H, to move the apparatus along the rails G through a pipe, (not shown on the drawings,) but in conjunction with which a double piston-valve, similar to that hereinbefore described and shown at Figs. 4 and 5, is or may be provided, or in lieu of the piston-valve a two-way cock may be employed. The water exhausting from the cylinder H is conducted through a pipe to the box or chamber Z, and discharged through the spout X. Instead of attaching the chain *d*, from which the cylinder I is suspended, to a drum, L, as shown, the said chain may be attached to a weight or weights, and in lieu of operating it by a wheel and tangent-screw, a hydraulic cylinder, rack and pinion, or other equivalent mechanism may be employed for that purpose; and, further, instead of employing water under pressure to operate the pistons in the cylinders of the drawing-machine, as hereinbefore described, steam, compressed air, or gas may be adopted in lieu

thereof, it being understood that I do not confine myself to the use of water, nor to arrange and construct the drawing-machine precisely in the manner illustrated on the appended drawings, as the same is capable of considerable modification without departing from the essence of my invention.

I claim—

1. The mechanism whereby the hydraulic cylinder H may be utilized in traversing the machine continuously in one direction, consisting of the wheels B, shaft C, bevel-wheels D, clutch E, bevel-pinion *a*, cross-shaft *b* provided with a spur-pinion, and hydraulic cylinder H provided with a rack, *e*, combined as and for the purposes described.

2. The mechanism whereby the rake is operated, and the ends thereof raised and lowered, consisting of the hydraulic cylinder I, provided with a piston-rod, to which the rake J is attached, pipes *i* and *k*, provided with branches *v* and *w*, chest *r'*, divided longitudinally by a diaphragm, *s*, double piston-valve *t*, valve-spindle *t'*, lever R, and ports *x*, communicating with the lower chamber of the chest V.

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

WILLIAM FOULIS. [L. S.]

Witnesses:

GEORGE MACAULAY CRUIKSHANK,  
JOHN MACNISH.