

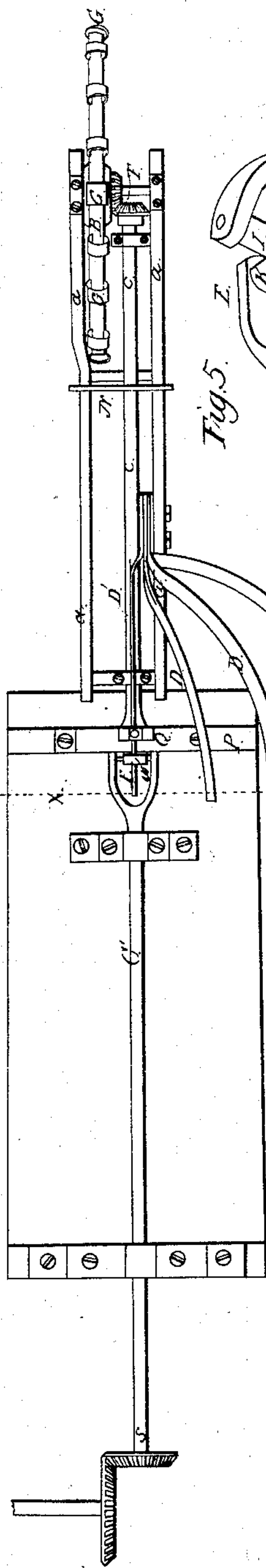
*S. Cram.*

*Excavator.*

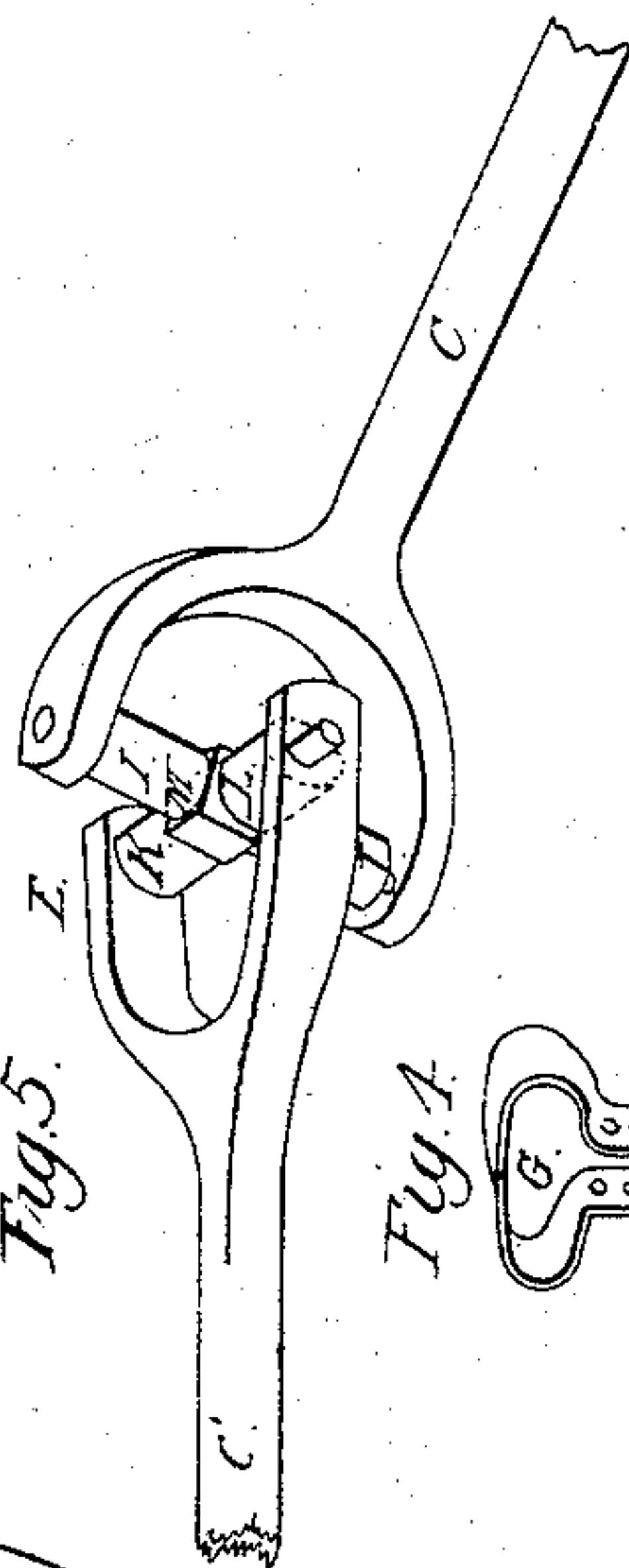
*Nº 989.*

*Patented Oct. 26, 1838.*

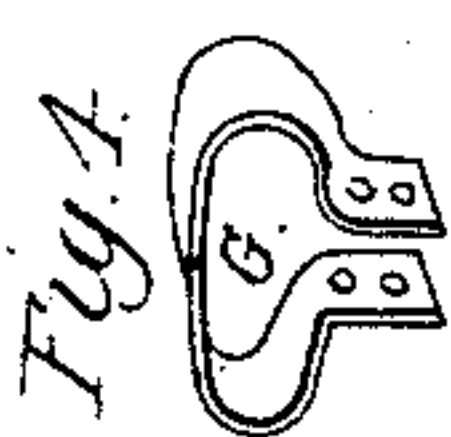
*Fig. 1.*



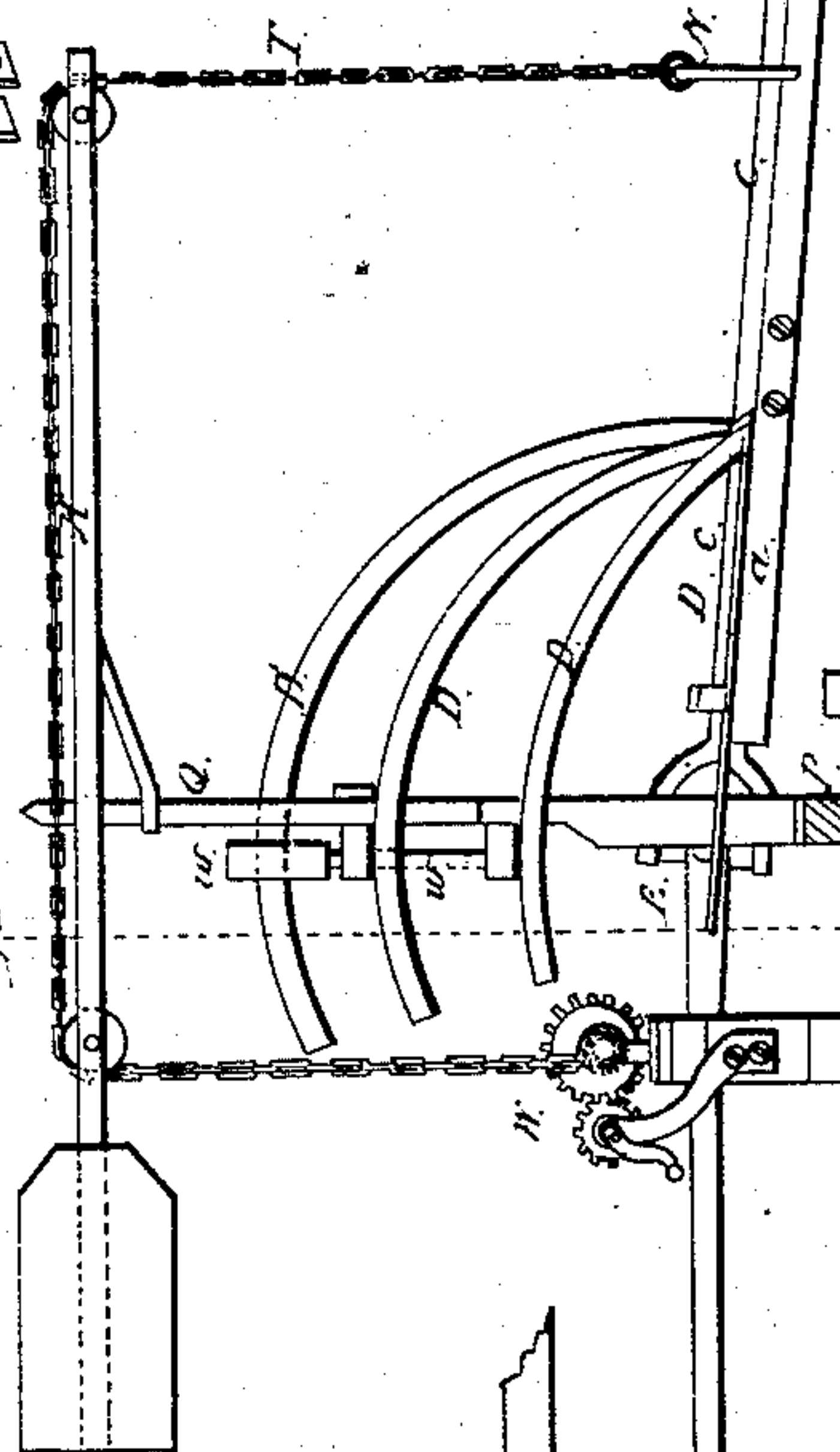
*Fig. 5.*



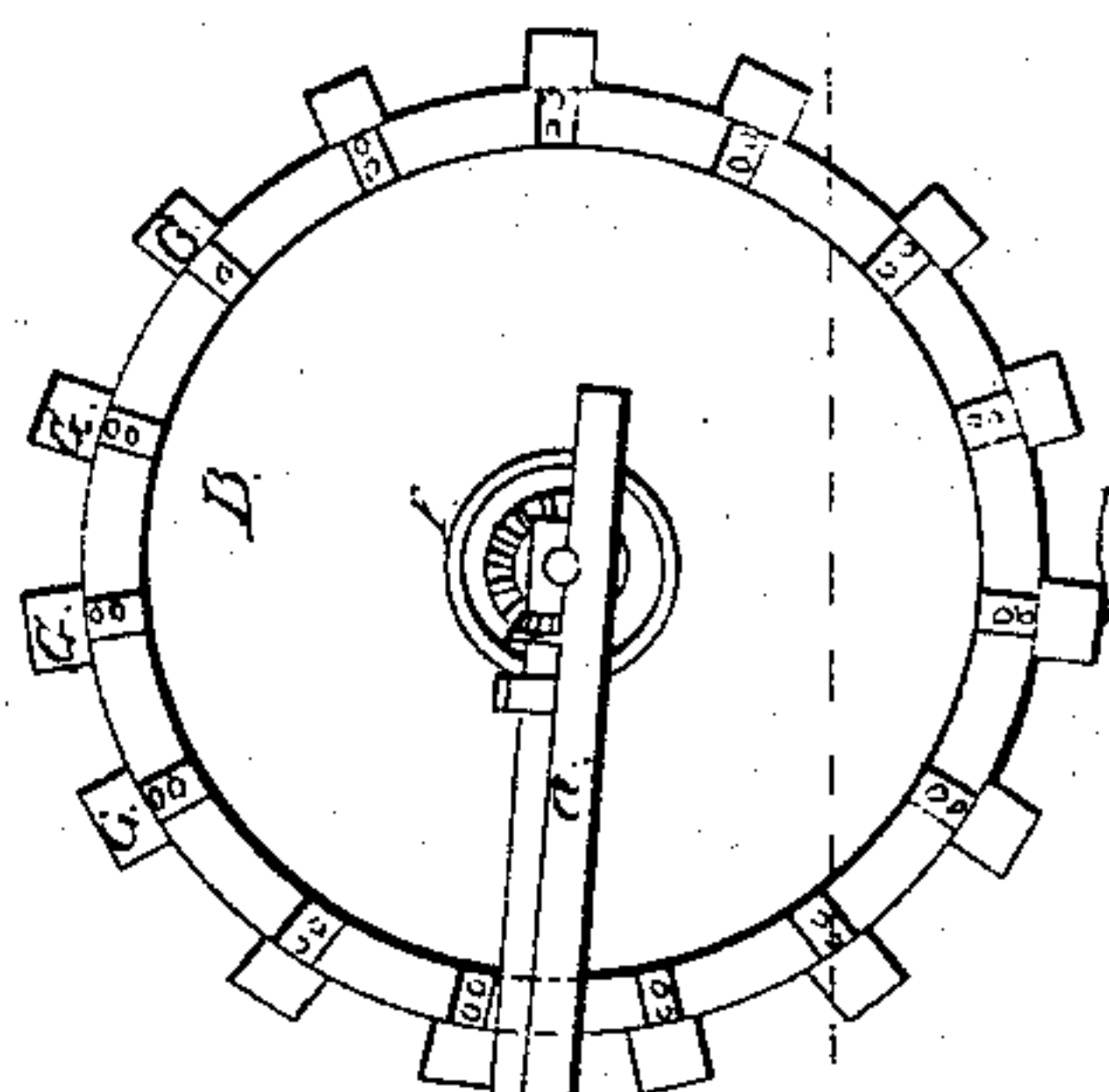
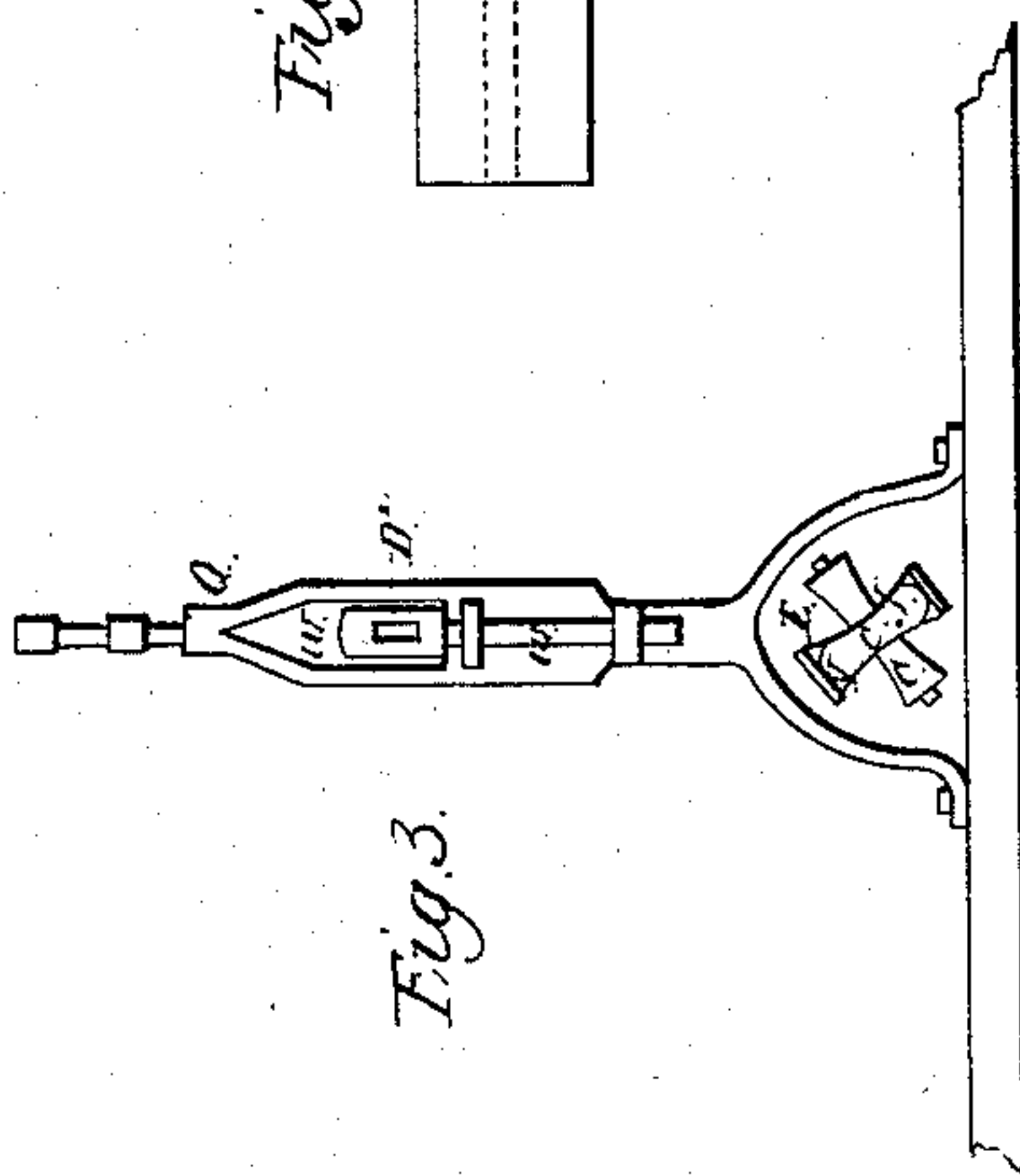
*Fig. 4.*



*Fig. 2.*



*Fig. 3.*





# UNITED STATES PATENT OFFICE.

SMITH CRAM, OF NEW YORK, N. Y.

MACHINE FOR CUTTING AND REMOVING OBSTRUCTIONS UNDER WATER, &c.

Specification of Letters Patent No. 989, dated October 26, 1838.

*To all whom it may concern:*

Be it known that I, SMITH CRAM, of the city, county, and State of New York, have invented a new and useful machine for cutting and removing obstructions in navigable streams and water-courses, whether consisting of rafts, trees, logs, stumps, roots, earth, or ice; also for cutting away timber and excavating earth for canals, roads, channels, &c., which I denominate "The Adjustable Cylindrical Excavator"; and I do hereby declare that the following is a full and exact description thereof, reference being had to the annexed drawings of the same, making part of this specification.

Figure 1 represents a top view of the machine. Fig. 2 represents a side view of the machine. Fig. 3 represents a section through the line X, X. Fig. 4 represents one of the knives or cutters detached. Fig. 5 represents the universal joint.

The letters of reference refer to the same parts in the several figures.

The nature of my invention consists in placing the immediate instruments of cutting or excavating on the periphery and sides of the outer rim of a wheel or cylinder of suitable dimensions, propelled by means of bevel gearing and a propelling shaft possessing, by means of a universal joint, the united powers of rotation and vibration without either motion materially interfering with or impeding the other; by which adaptation and combination of the principles and powers of those members or parts I am enabled to reach and apply the power of cutting or excavating to a distant object or place, and move the same from one object or obstruction to another within a large scope or space during the continued operation of the propelling power, the boat, structure, or place on which the propelling power is placed remaining at the same time more stationary.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation. First, I construct an oblong frame *a, a*, Figs. 1 and 2 of the length, breadth, and strength required, according to the depth or distance desired to reach beyond the boat, or other structure, upon which the propelling power of the machine is intended to be stationed. Near the end of this frame I place a metallic wheel or cylinder B, intended to revolve on its axis which is placed at right angles with

the sides of the oblong frame *a*. On and near the outer surface or periphery and at the sides of the rim of the wheel or cylinder I place a suitable number of metallic cutters G, either in line with the axis or diagonally as occasion may require. These cutters, although let into grooves in the sides of the rim of the wheel or cylinder, are removable at pleasure and can be of different forms, as well as sizes, to suit the particular work on which they are employed. The gouge-like knife or cutter I find very efficient as is represented in the drawing at Fig. 4.

The wheel or cylinder is propelled by a shaft C, C, connected at its end by bevel gearing F to the central part of the wheel or cylinder B, then passing lineally through the frame and to the universal joint, and onto the boat or other structure upon which the propelling power is placed.

At or near the outer edge of the boat or other structure aforesaid and the end of the frame above mentioned the shaft contains a universal joint E, which admits the outer part of the shaft beyond the joint, the frame, and the wheel or cylinder to vibrate or revolve (the joint forming the pivot) so that the wheel or cylinder is capable of being directed and reaching any point within the superficies of a segment of a sphere whose semi-diameter is not greater than the length of the outer part of the shaft, and operate efficiently at an inclination from the line of the inner part of the shaft of at least forty five degrees in any direction without affecting materially the rotary motion of the same, which propels the wheel or cylinder.

The universal joint may be described as follows, viz, Suppose the four arms I, J, K, L, Fig. 5, two of which are at right angles with the other two and all united at their common center at M, the inner part of the shaft C, forks and receives the ends of the arms K, L, and the outer part of the shaft forks and receives the arms I, J, each with a simple rolling joint, together forming the universal joint proposed to be used. But any other kind of joint similar in principle and suitable for the purpose may be used.

The cutters may be formed sharp fore and aft and left open so as not to clog with the material in which they operate and the wheel or cylinder is geared so as to revolve in either direction. The cutters project also from the sides of the rim of the wheel or cylinder in order to cut laterally if neces-



sary, to avoid the pinching sometimes attending the operation of the saw under similar circumstances.

The frame and wheel or cylinder are moved, borne and directed to their object by means of a common crane H with windlass W placed immediately over or near the universal joint E. And the frame and wheel or cylinder are canted to any inclination between the vertical and horizontal, and there fixed until its immediate purpose is answered by means of curved guides D, D, fixed to the movable frame *a a* and passing through end resting on a swivel, *w*, over or behind the universal joint. When the position of the cutting wheel is to be changed it is depressed until the curved guide D' is drawn out of a mortise D<sup>2</sup> in the swivel *w* and then turned on the universal joint to the position in which it is required to be placed and another curved guide D inserted in the same mortise and the wheel again raised by the windlass. The chain is prevented from running back by means of a ratchet wheel and pawl on the windlass, or any one of the usual means adapted to prevent the reverse motion of the windlass.

Should it be desired to work this machine from the bow or other part of a steamboat, the power of the engine on board is applied to it by the ordinary connections and gearing at S. The propelling power being applied to the inner end of the jointed shaft, C, at S causing it to revolve, imparts the rotary motion to the cutting wheel B with any velocity, which, by its gearing, you may be pleased to give it. The wheel or cylinder B is canted to any required inclination by means of the curved guides D and swivel *w*

and there fixed until its immediate purpose is answered. 40

The frame *a a* outer part of the jointed shaft C and wheel, or cylinder B are all borne by means of the crane H, whose cord or chain T is connected with the semi-circular bail N, affixed to the frame *a a* as represented in Figs. 1 and 2 by means of all which the cutting or excavating wheel or cylinder is capable of being elevated or depressed and swung, guided and directed to its objects, and perform its operations within the scope above mentioned. 50

The invention claimed and desired to be secured by Letters Patent,

Consists in the before mentioned and described combination of the adjustable cutting wheel or cylinder, with the universal joint, crane having a windlass or other power, and curved guides, producing a machine capable of being extended beyond the bow or side of a vessel, stage or other place in which the propelling power is placed, said wheel or cylinder being directed, adjusted and held in any position on land, in water or other place for cutting excavating or performing whatever office to which it may be applied, by means of the crane, windlass, and guides, the universal movement of the cutting wheel or cylinder not materially interfering with the propelling power supported on the vessel or elsewhere by the use of the universal joint in the propelling shaft. 60 65 70

SMITH CRAM.

Witnesses:

L. B. WOODRUFF,  
R. M. WOODRUFF.