3 Sheets—Sheet 1.

I. S. SCHUYLER.

Machine for Cutting Screw Threads.

No. 230,825. **Patented Aug. 3, 1880.**

Fig: 1.

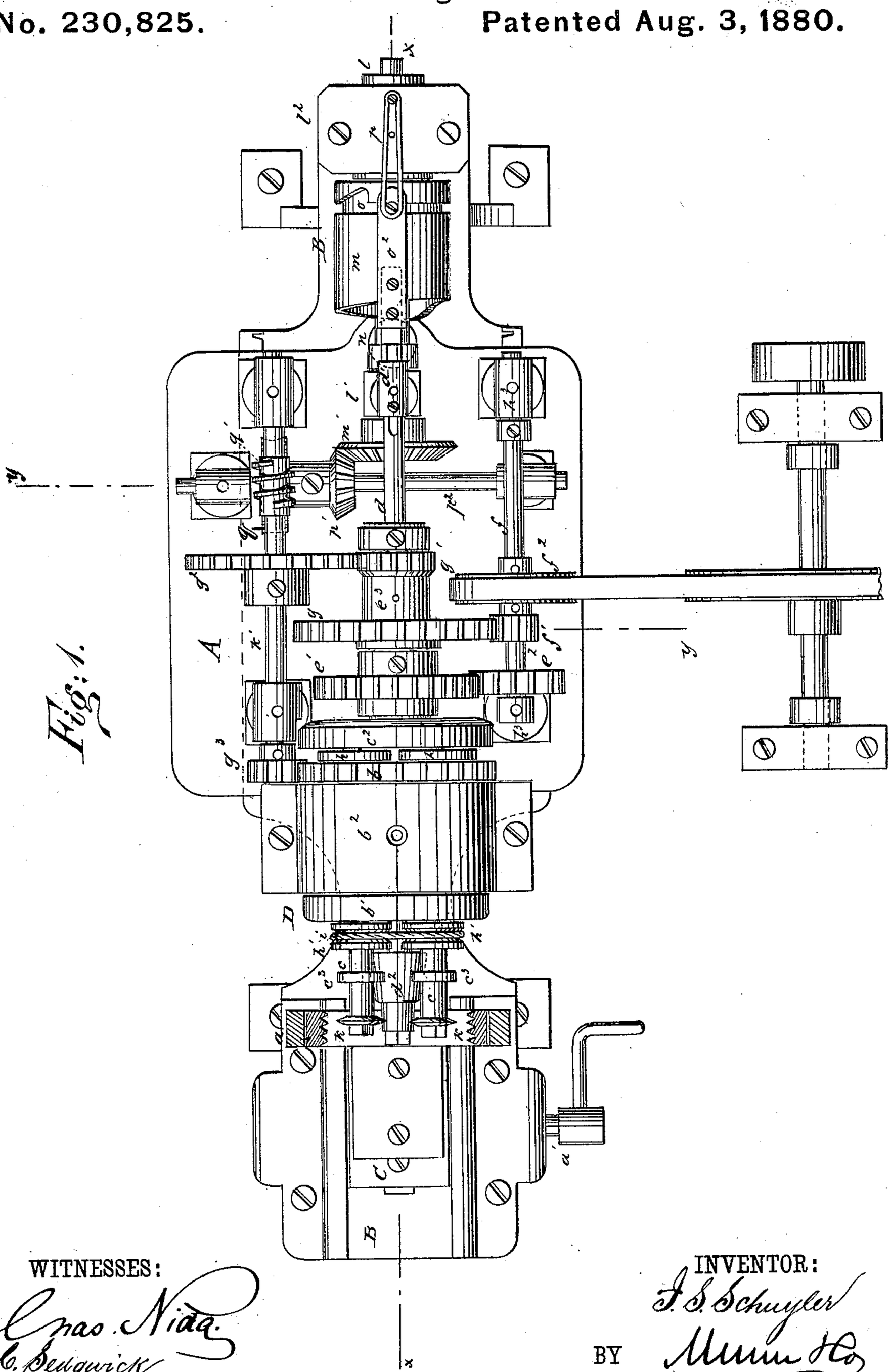

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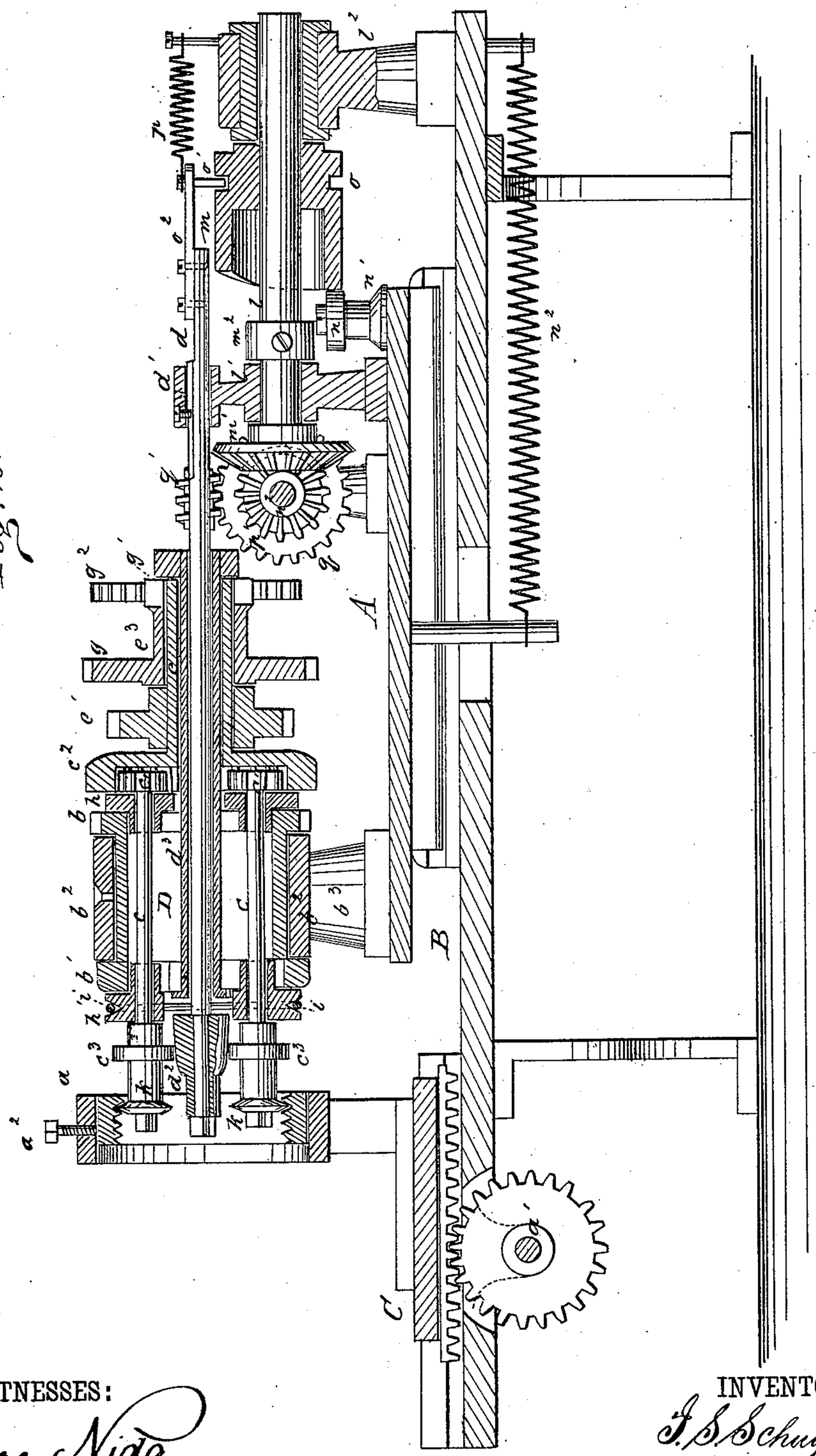
Fig: 2.



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I. S. SCHUYLER.

Machine for Cutting Screw Threads.

No. 230,825. **Patented Aug. 3, 1880.**

Fig: 3.

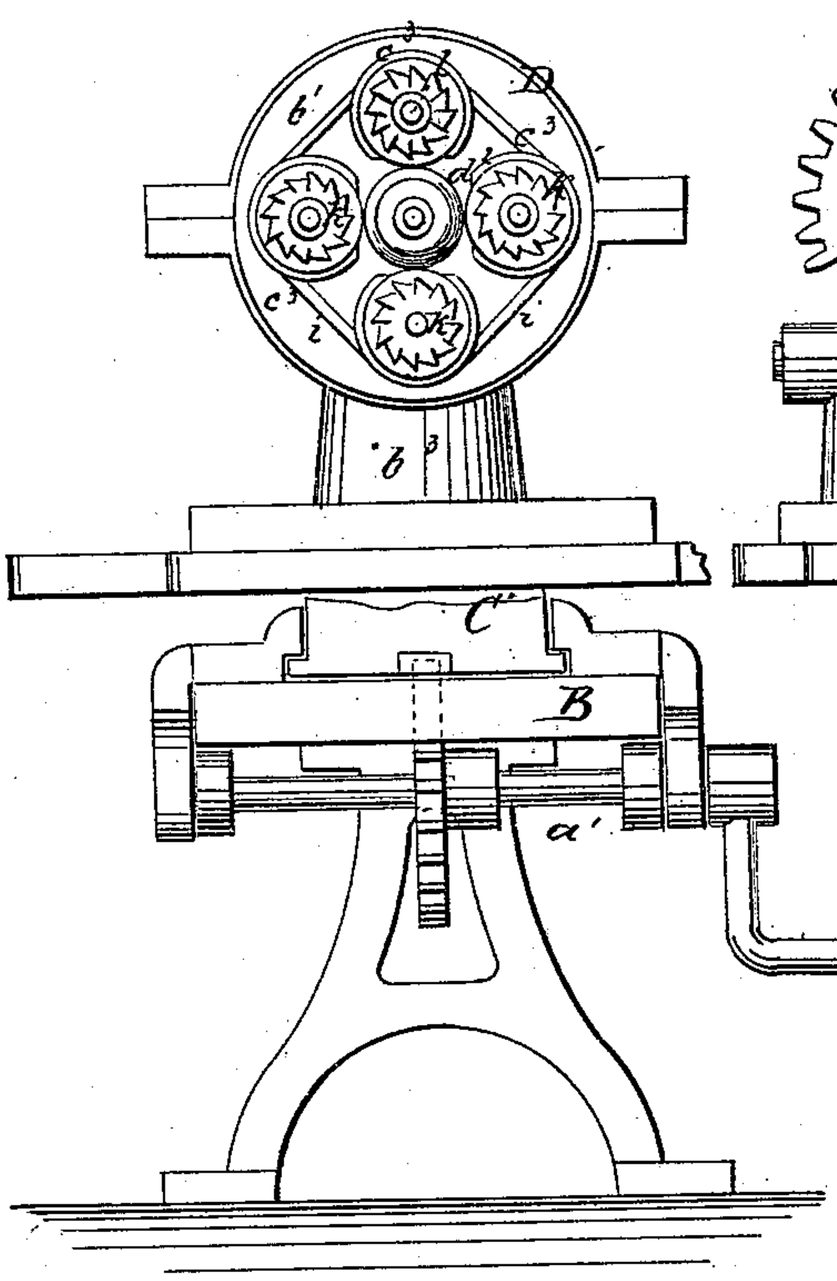


Fig: 4.

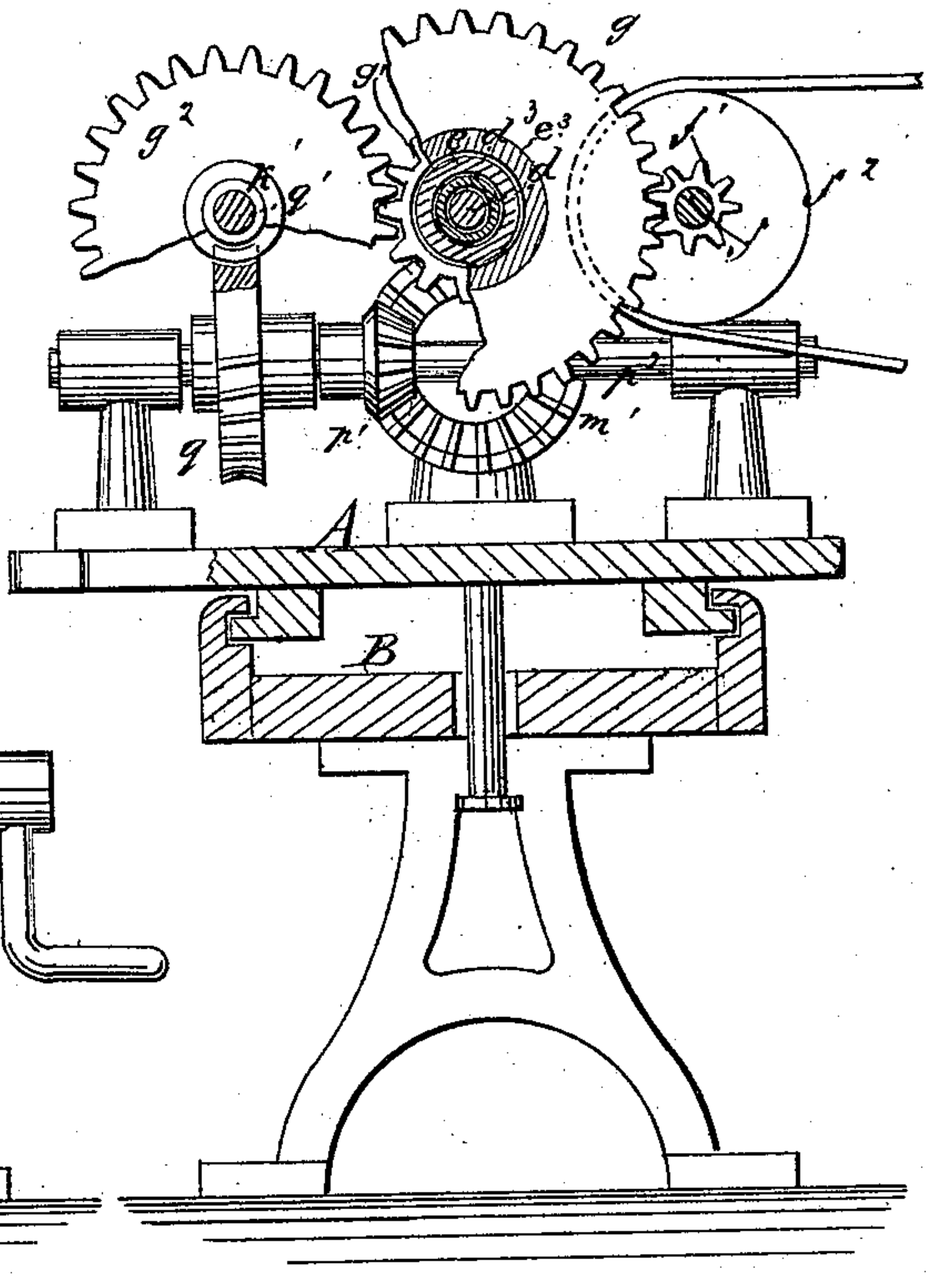


Fig: 5.

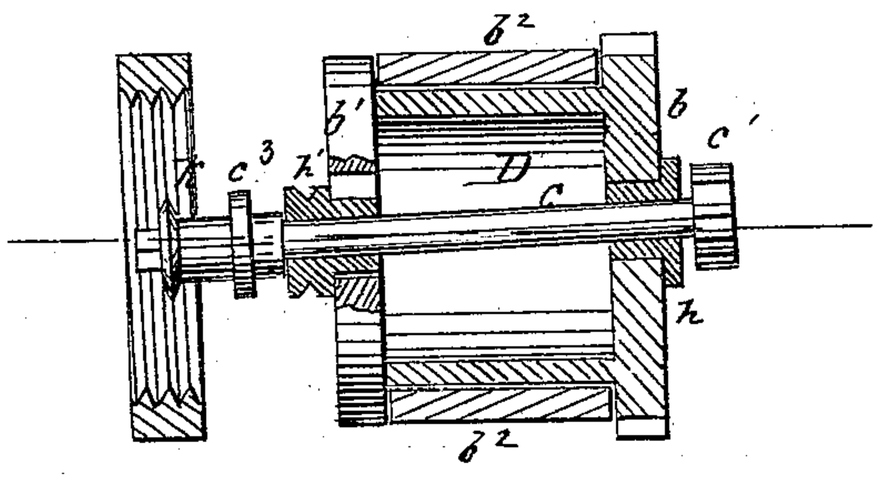


Fig: 8.

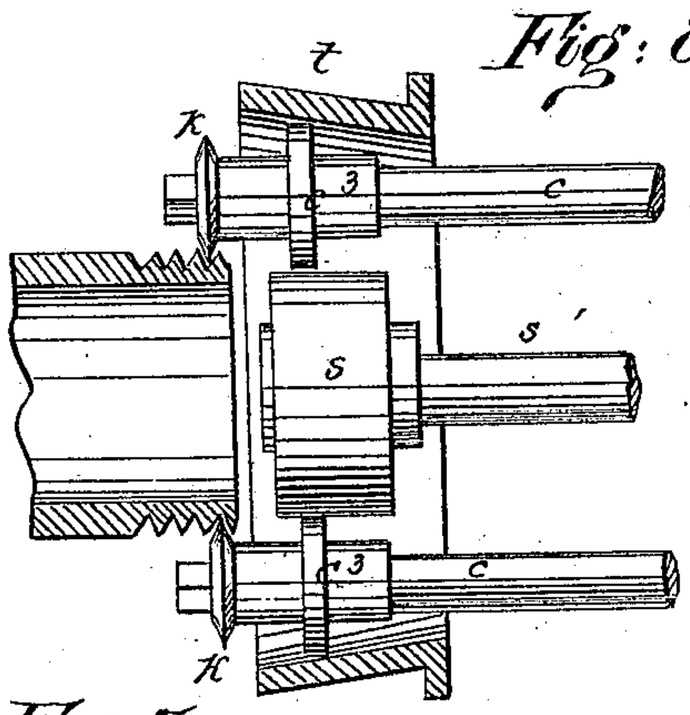


Fig: 6.

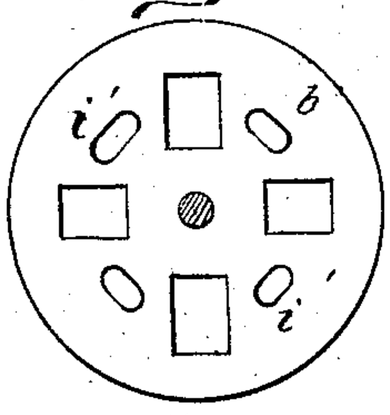
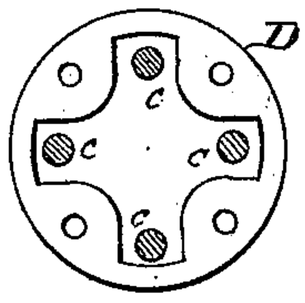


Fig: 7.



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UNITED STATES PATENT OFFICE.

ISAAC S. SCHUYLER, OF BROOKLYN, NEW YORK, ASSIGNOR TO HIMSELF AND ISAAC S. METTLER, OF JERSEY CITY, NEW JERSEY.

MACHINE FOR CUTTING SCREW-THREADS.

SPECIFICATION forming part of Letters Patent No. 230,825, dated August 3, 1880.

Application filed October 17, 1879.

To all whom it may concern:

Be it known that I, ISAAC S. SCHUYLER, of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Machines for Cutting Screw-Threads, of which the following is a specification.

My improvements relate to machines for cutting screw-threads upon pipes and couplings, internally and externally, and have for their object to accomplish such work more rapidly and perfectly than has heretofore been done. I make use of rotary cutters formed with serrated edges, the arbors of which cutters are fitted in a revolving head that has an endwise motion proportioned to the pitch of the screw, so that while the cutters rapidly revolve with their arbors they also travel in a spiral path upon the surface being operated upon.

The construction and operation of the machine will be particularly described with reference to the accompanying drawings, forming part of this specification, and the invention pointed out in the claims.

In the drawings, Figure 1 is a plan view of the machine in a form for cutting an internal screw. Fig. 2 is a vertical longitudinal section on the line *x x* of Fig. 1. Fig. 3 is an end view of the machine, giving a front view of the cutters. Fig. 4 is a vertical transverse section on the line *y y* of Fig. 1. Fig. 5 is a section of the cutter-head, showing the construction whereby the cutter-arbors are held to the proper inclination or pitch. Fig. 6 represents a part of the cutter-head. Fig. 7 is an end view of head D with the cap *b* removed. Fig. 8 is a sectional view, showing the cutters as arranged for cutting an external thread.

Corresponding parts are indicated by similar letters of reference in all the figures.

The operative parts of the machine are mounted upon a carriage, A, that will be fitted to reciprocate in slides or on rollers on a suitable bed. As shown, the carriage A is formed with flanged ribs at its under side, which enter grooves in the side flanges of the bed B, whereby the carriage may slide to and from the slide-block C, which is fitted at one end of bed B and carries the work.

The slide-block C is fitted to move in a suitable slideway lengthwise of bed B, and is fitted at its under side with a rack gearing with a pinion on a cross-shaft, a', which shaft is fitted with a hand wheel or crank whereby the block C may be moved. Upon the block C is a post fitted with a ring, a, of a size for receiving the coupling to be operated upon, which is to be placed at the inside of ring a and clamped by the set-screw a^2. The ring a will sustain the coupling upon all sides against the pressure of the cutters and prevent irregularities of the screw resulting from springing.

The revolving head D consists of a hollow cylinder provided with a fixed cap, b, and removable cap b', and fitted in the boxes b^2, the bottom one of which is sustained by a post, b^3, that rises from the carriage A.

The head b is formed as a gear-wheel, and receives motion from a secondary shaft, as hereinafter described.

The arbors c, carrying the cutters, extend through the caps b b', in which they have bearings, and are fitted at their forward projecting ends with the cutters k. At the rear end, behind cap b, the arbors c are fitted with pinions c', that mesh with an internally-geared ring or recessed disk, c^2.

Before describing the manner in which the arbors c are fitted for adjustment, I will describe the adjacent co-operating parts.

Through the center of head D passes a rod, d, sustained at the back of the machine in a box, d', which is fixed on the carriage A, (the rod d sliding in box d' and held from turning by a slot and pin,) and at the forward end the rod d is fitted with a loose cone, d^2, upon which the collars c^3 of the arbors c rest. Around the rod d is a tube or sleeve, d^3, and upon this tube is the sleeve e, that carries the internally-geared disk c^2, and upon sleeve e is fixed the gear-wheel e', that meshes with the pinion e^2 of the driving-shaft f, which is fitted in boxes h^3 on carriage A.

Upon sleeve e is a loose collar, e^3, that is formed with a large gear-wheel, g, that meshes with a pinion, f', on the driving-shaft, and the collar e^3 is also formed with a small gear-wheel, g', that meshes with a large gear-wheel, g^2, of the secondary shaft k', which also carries a

pinion, g^3, meshing with the toothed cap b to revolve the head D.

The caps b b' of the revolving head D are formed with rectangular apertures, as shown in Fig. 6, to receive the boxes h h', that carry the arbors c. The boxes h' project in front of the cap b', and are grooved externally to receive the elastic band i, which serves to draw the boxes and arbors c to the center and retain the collars c^3 upon the cone d^2, so that the depth and consequently the diameter of the thread cut by the machine is regulated by the position of the cone, and the cutters will be collapsed by withdrawal of the cone.

The cap b' is attached to head D by screws passing through slots i' in b', (see Fig. 6,) so that by turning the cap the arbors c will be thrown at an angle more or less to the axis of the head D, and the cutters k caused to revolve and cut the thread of the screw with more or less pitch.

By the above-described construction and arrangement, while the head D is revolved and carries with it the cutter-arbors c, the arbors c have a rapid independent revolution, the proportion being seventy revolutions of the arbors c to one of head D.

I prefer to use four arbors, c, as shown, and each arbor may carry two or more cutters, or from eight to twelve cutters in all, graduated in diameter so that the rear cutters will finish the thread cut by the forward cutters.

The cutters k consist of circular steel disks formed with beveled and serrated edges, which are very effective in cutting.

The mechanism for automatically moving the carriage forward and back and collapsing and expanding the cutters is as follows: Upon the back of carriage A, on the central line of the machine, is a box, l', sustaining one end of a shaft, l, the other end of which is supported in bearings on the pillow-block l^2, that rests on the bed B. Upon the shaft l is a cylinder, m, held by a pin or feather that enters into a slot in the shaft, so that while the cylinder m turns with the shaft the shaft may move forward and back with the carriage, which it is caused to do by the hub of bevel-gear m' and collar m^2, which are fixed on shaft l at opposite sides of the box l'. The forward end of cylinder m is formed as a spiral cam, upon which bears the friction-roller n, that is fitted upon a stud, n', at the rear of carriage A, so that by one revolution of roller m the carriage A will be gradually forced forward the length of the coupling, or that part thereof in which the screw is formed by the cutters and withdrawn.

A spring, n^2, or a weight in place thereof, serves to withdraw the carriage, and the cam will be formed so that the withdrawal will be made quickly, sufficient time being allowed for removal of the completed screw and the substitution of a new piece of work.

The cylinder m is also formed with a peripheral groove, o, into which enters a pin, o', that projects from an interchangeable extension-piece, o^2, of the rod d. The groove o is formed most of its length in a plane at right angles to the axis of cylinder m, whereby it retains the rod d and cone d^2 projected and the cutters k expanded, and for the remainder of its length it is spiral, the spiral portion terminating abruptly at a point coinciding with that portion of the cam-cylinder m that completes the forward movement of carriage A, so that when the pin o' reaches the abrupt end of cam-groove o the spring p, that is connected to the piece o^2 and pillow-block l^2, will cause endwise movement of rod d with the cone d^2, and the cutters k will be collapsed by the elastic band, so that they may withdraw from the work. The further movement of cylinder m projects the cone and expands the cutters before the carriage again moves forward. The piece o^2 is attached to rod d by screws, so that it may be changed to lengthen or shorten the rod for expanding the cutters more or less.

The shaft l is revolved by a bevel-gear, p', on a cross-shaft, p^2, that is fitted in boxes on carriage A, and fitted with a worm-wheel, q, that meshes with a worm, q', on the secondary shaft k'.

The driving-shaft f is provided with a pulley, f^2, for connection by a belt with suitable power.

The operation of the machine is indicated in the above description to such an extent that a further description will not be required.

The cone d^2 being loose will be revolved by contact of the collars, and the friction thereby lessened.

It will be seen that the forward movement of the head D with the carriage, with the revolving motion, causes the cutters to act in a spiral path. To change the pitch the cam-cylinder m will be changed.

For cutting an external thread the parts may be arranged as shown in Fig. 8. In this case the collars c^3 of the arbors c rest on an elastic wheel, s, that is on a fixed shaft, s', and the cutters are forced inward to the work by a tapering sleeve, t, that bears on the collars, which sleeve will be fitted to revolve, and provided with an offset to permit expansion of the cutters by the elasticity of roller s.

The machine, as above described, is more especially adapted for threading what are known as "fittings."

For wide couplings having a longer screw the forward movement of the carriage may be given by a screw, and the backward movement by a reverse movement at higher speed.

I do not limit myself in these particulars, nor to the details generally, exactly as described, as they may be varied without departing from my invention.

In the above-described machine the use of oil is dispensed with and the threads cut dry, thereby saving the expense of oil and rendering the chips or cuttings more valuable, as they will be free from oil and dirt.

The method of cutting produces a more perfect-fitting screw than can be made with taps

and dies in the usual manner, for the reason that a tap, in order to insure its entering, must be beveled at the end, thereby leaving the large end of the pipe or small end of the fitting with the first few threads flattened or only about half-depth, while my machine will cut a perfect thread from beginning to end.

When fittings are clamped for cutting by taps or dies in the usual manner, the pressure stretches the iron so that the thread cut with a tap having a given number of threads to the inch will not match a thread of the same number cut by a lathe.

In my method of cutting, the fitting is held solidly and the thread cut will be accurate to the gage.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, in a screw-cutting machine, of the head D, having fixed gear-wheel cap b, the boxes b^2, post b^3 on movable carriage A, the boxes h h', the cutter-arbors c, having pinions c' and collars c^3, the internally-geared ring c^2, the rod d, having loose cone d^2, sleeve d^3, sleeve e, having gear-wheel e', and the driving-shaft having pinion e^2, as and for the purpose described.

2. The carriage A, springs n^2, and stud n', having friction-roll n, in combination with the cam-cylinder m, shaft l, pillow-block l^2, bevel-gear m', bearing l', and collar m^2, as and for the purpose set forth.

3. The cylinder m, having circumferential cam-groove o, in combination with the rod d, having cone d^2, the extension-piece o^2, having pin o', the spring p, arbors c, boxes h h', elastic band i, and cutters k, as and for the purpose specified.

ISAAC S. SCHUYLER.

Witnesses:
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GEO. D. WALKER.