

J. Crum,

Making Wood Screws,

N^o 5,794.

Patented Sep. 19, 1848.

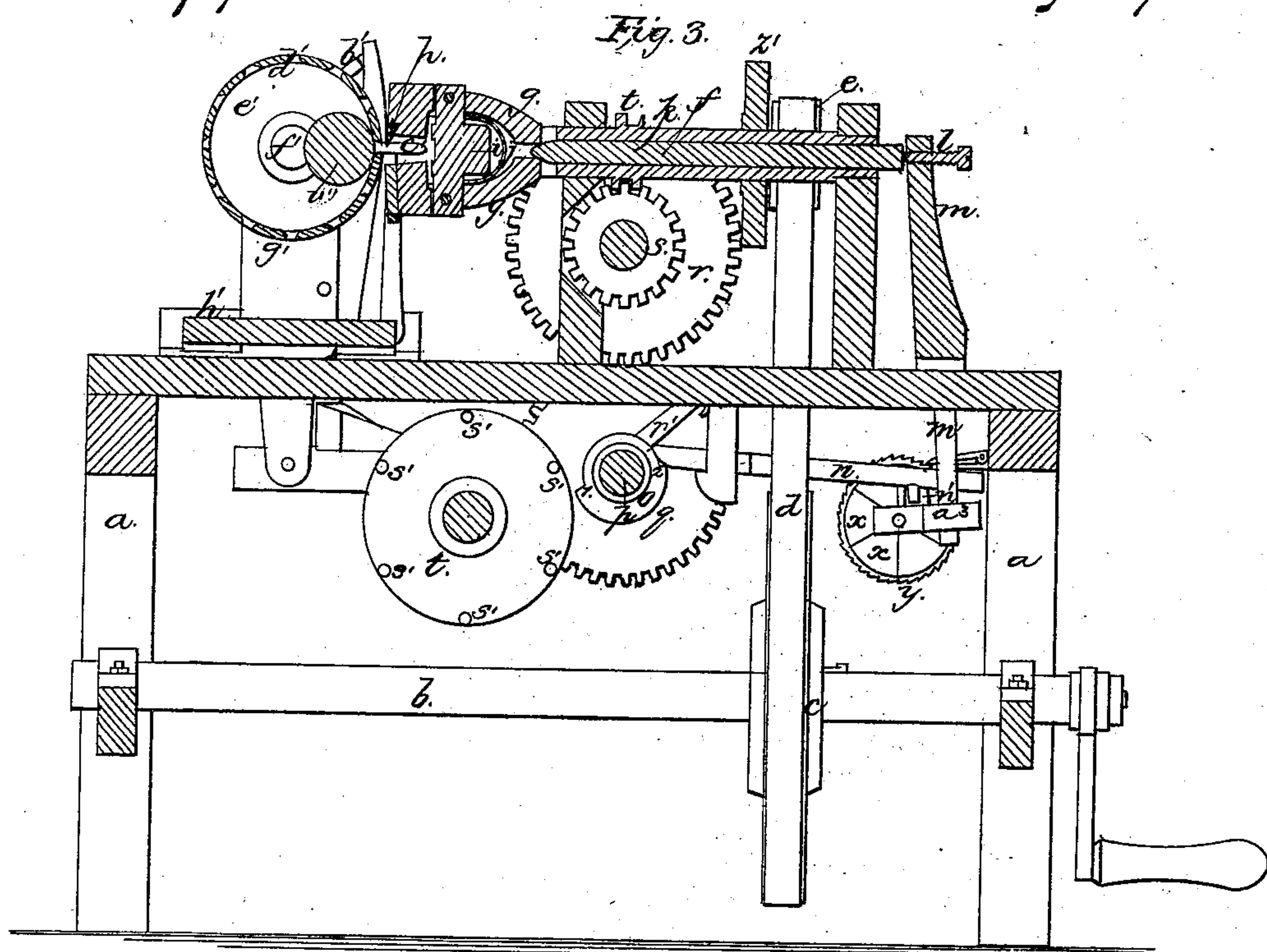
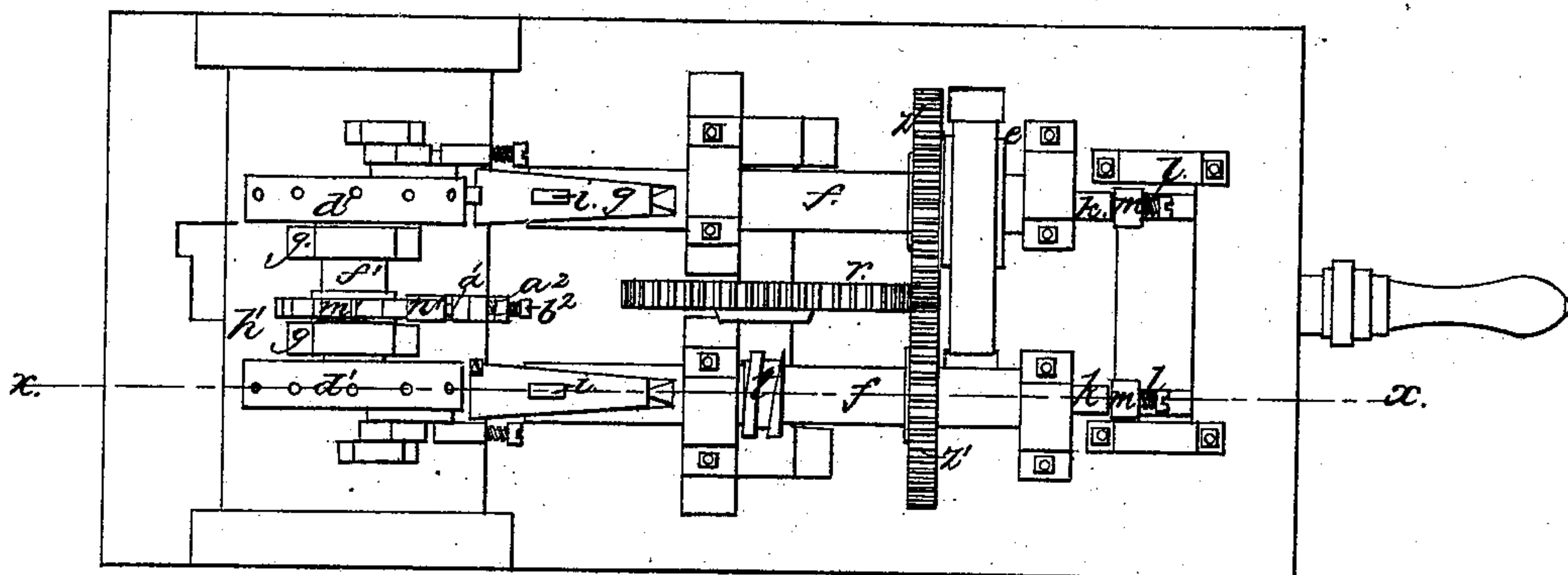
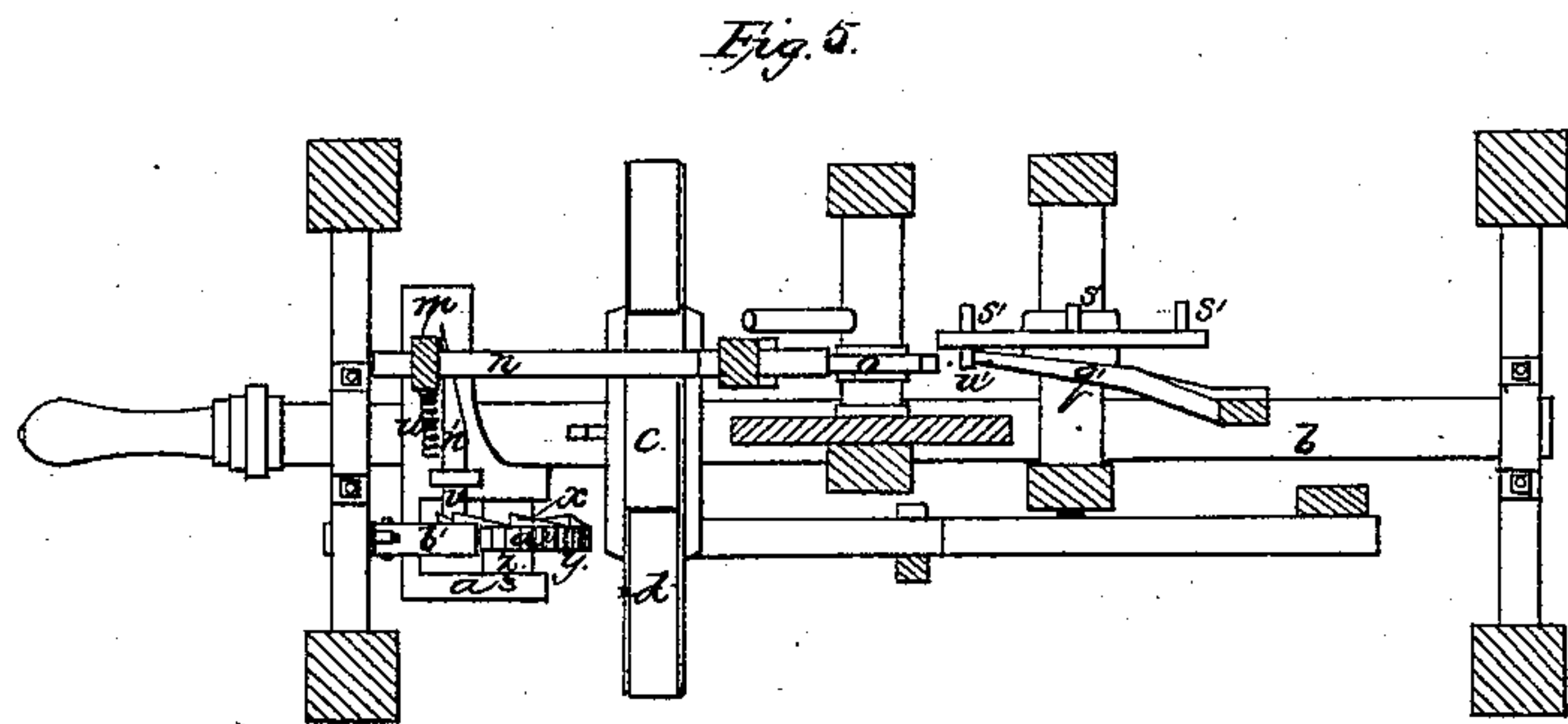
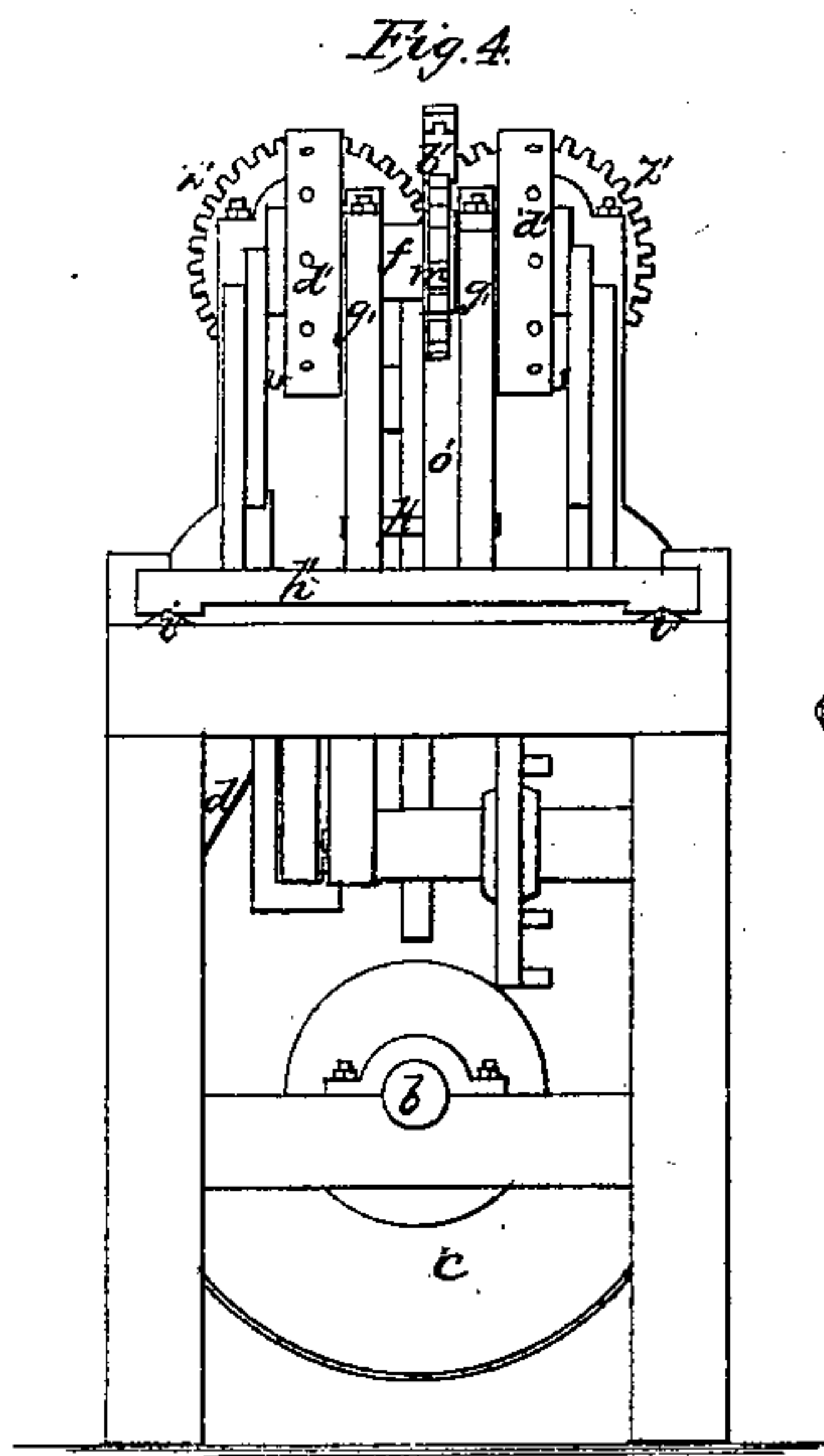
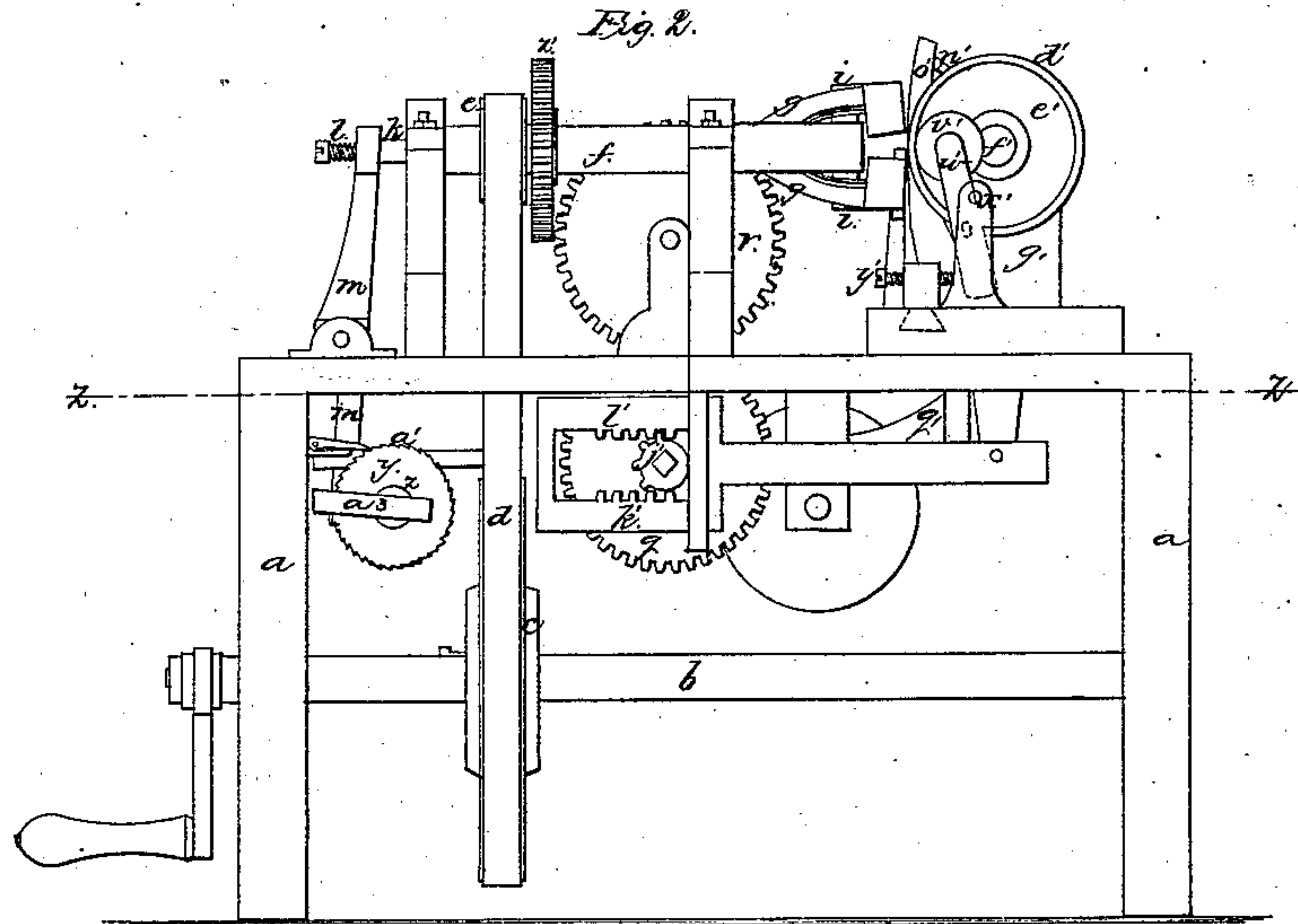


Fig. 1.



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UNITED STATES PATENT OFFICE.

JOHN CRUM, OF RAMAPO, ASSIGNOR TO HENRY L. PIERSON, OF
NEW YORK, N. Y.

IMPROVEMENT IN SCREW-THREADING MACHINES.

Specification forming part of Letters Patent No. 5,794, dated September 19, 1848.

To all whom it may concern:

Be it known that I, JOHN CRUM, of Ramapo, in the county of Rockland and State of New York, have invented new and useful Improvements in Machines for Cutting the Threads of Wood-Screws; and I do hereby declare that the following is a full, clear, and exact description of the principle or character which distinguishes them from all other things before known and of the manner of making, constructing, and using the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a plan of the machine; Fig. 2, an elevation of the left-hand side; Fig. 3, a longitudinal vertical section taken at the line $x x$ of Fig. 1 and looking in the direction of the arrow; Fig. 4, a front elevation, and Fig. 5 a horizontal section taken at the line $z z$ of Fig. 2.

The same letters indicate like parts in all the figures.

In machinery for threading screws as heretofore made the pitch of the thread is given either by moving the dies along that part of the blank which is to be threaded (the blank being rotated by jaws on a spindle) or by moving the blank itself while it rotates with the jaws that hold it on the end of a spindle. In general the blank is held still by gripping-jaws and the dies have a rotary motion and a series of reciprocating motions to chase or cut the thread, which is completed by a series of operations to insure a good thread. In one machine extensively used the blanks are fed by hand in holes made in the rim of a wheel which has an intermittent motion to remove the threaded screw and present the blanks to the dies, which of necessity must have a reciprocating motion to traverse on the shank of the blank to form the thread. Experience has shown this to be somewhat defective and to be complex and therefore liable to derangement.

The object of my invention is mainly to avoid the defects of the last-named machine; and the nature of my invention consists in giving a reciprocating motion to a carriage in which is hung the shaft of the carrying and holding wheel to draw the stem of the blank from the dies as they rotate to give the pitch to the thread and to return it to the dies for

a succession of operations until the thread is cut, this series of motions being given by a simple segment cog-wheel, the cogs of which act alternately on an upper and a lower rack connected with the carriage, and also in giving to the carrying and holding wheel an intermittent rotary motion (to remove a threaded screw and present a blank) from a wheel below provided with a pin on its face, which at every rotation lifts a lever the upper end of which is provided with a hand that acts on the teeth of a ratchet-wheel on the shaft of the carrying-wheel to turn it the required distance for the presentation of a blank, the wheel that carries the lifting-pin being turned a part of a revolution for each cut of the dies by an arm on the shaft of the cam that closes the dies, the number of teeth or pins on the wheel that are to be struck by the arm on the crank-shaft being such for each pin on the other face of the wheel as to correspond with the number of cuts to be given by the dies for the completion of the thread of the screw.

The nature of my invention also consists in holding the blanks while under the operation of the dies by the pressure of a spring-roller within the rim.

The last part of my invention consists in closing the dies for the cutting of the threads by means of a cam which makes one revolution for each cut and acts by means of a sliding rod on a lever that forces a rod in the hollow arbor of the jaws to close them when this is combined with a sliding wedge-piece interposed between the sliding rod and the lever to increase the depth of the cut at each operation, the said wedge-piece being made to slide for this purpose by means of another cam combined therewith.

In the accompanying drawings, a represents a frame properly adapted to the purpose, and b the main driving-shaft, with a pulley c , from which a belt d passes to a pulley e on a hollow mandrel f , that carries the jaws $g g$, in which are secured dies or chases $h h$, made in the usual manner. The jaws are jointed to ears $i i$ on the end of the mandrel, with springs $j j$ interposed, that tend constantly to keep the jaws open, and the rear end of the levers pass into the mandrel and are there acted on to force the dies together in threading the screw by the conical end of the rod

k , that slides within the mandrel. The rear end of this rod passes out of the mandrel and is acted on when the jaws are to be closed by the point of an adjustable screw l on the upper end of a lever m , the lower arm of the said lever being acted upon by a sliding rod n , that bears against the face of a cam o on a transverse shaft p . The form of this cam is such that from the point 1 to 2, extending one-half of the circumference, it is concentric at the point 2. It suddenly runs out from the center to close the jaws, and therefore to make the dies grasp the shank of the blank, and then from this sudden swell to the point 3 it gradually runs out from the center to increase the bite of the dies, and then by a radial line it runs back to the point of beginning to permit the springs to force open the jaws that the screw-blank may be run back for a repetition of the operation. This cam receives its motions from the mandrel by a train of cog-wheels q r s , the one q being on the shaft of the cam and engaging with the cogs of the one r , which is on the shaft of the wheel s , that is actuated by an endless screw t on the mandrel.

Between the lower arm of the lever m and the sliding rod n there is interposed a wedge-formed slide n' , placed at right angles with the sliding rod n . The end v of this slide is forced by a spring w against the face of a series of cam-formed projections x on the face of a wheel y on a shaft z , the periphery of the said wheel being provided with teeth a' , which strike against a pawl or hand b' , jointed to the main frame, the shaft of the said wheel y having its bearings in a frame a^3 , attached to and moved by the lever m , so that at every back motion of the lower end of this lever to open the jaws the wheel y is turned a portion of a revolution that the cam-formed projections x may act on the end of the wedge-formed slide and force it back, and thus cause the threading-cam at each operation to close the cutting-dies more, and in this way complete the cutting of the thread by a series of operations. The cam-formed projections x are a series of planes inclined to the plane of the face of the wheel from which they project, and the length of each is such relatively to their motion as that each shall move its whole length for the complete cutting of one screw, and of course the number of these cam-formed projections will depend on the diameter of the wheel to which they are attached and to the extent of the motion of the said wheel.

The screw-blanks c' are inserted in holes in the rim d' of what is called the "carrying" and "holding" wheel e' , the rim being made to project from the face of the wheel sufficiently for this purpose. The shaft f' of this wheel runs in standards g' of a carriage h' , that runs on ways i' i' , and this carriage receives a reciprocating motion to move the blank toward and from the chasers or dies by a segment cog-wheel j' on the shaft of the

threading-cam. The cogs extend over a little less than one-half of the circumference, and alternately act on the teeth of a lower rack k' to move the carrying-wheel toward the cutting-dies and then on the cogs of an upper rack l' to run it back to form the thread, the said racks being formed in the opening of a bar attached to the carriage of the carrying-wheel. In this way the motions back and forth of the carriage are given to determine the pitch of the threads and to return the screw for the repetition of the operation. So soon as a screw has been threaded it must be carried away and a blank presented to the dies. This is done in the following manner: On the shaft of the carrying-wheel there is a ratchet-wheel m' , which is turned by a hand n' on the end of a lever o' , that turns on a fulcrum at p' . The lower arm is bent, as at q' , so that when lifted the hand on the upper end turns the ratchet-wheel, and with it the carrying-wheel, the required distance to carry off the threaded blank and present a new one.

The lever is operated in the following manner: On the threading-cam shaft there is an arm r' which, at every rotation of the shaft strikes one of a series of pins s' , projecting from a wheel t' , to turn it a distance equal to the space between the centers of any two of these pins, and on the other face of this wheel there is a pin u' , which at every entire revolution of the wheel strikes under the bent arm of the lever o' and gives it the requisite motion to turn the carrying-wheel. Back of the lever o' there is a standard a^2 , with a set-screw b^2 , against which the lever strikes when thrown back by the weight of the bent part q' , so that by the set of this screw the extent of motion of the lever and the carrying-wheel can be determined. The position of the arm r' on the segment cog-wheel shaft relatively to the segment of cogs should be such that the carrying-wheel will be turned for removing the threaded screw and presenting a blank when the carriage is farthest from the jaws, and the number of pins s' on the wheel t' must be equal to the number of times it is intended that the chasers or dies shall pass over the blank to complete the thread; but, if desired, this number may be doubled, trebled, &c., by having two, three, &c., pins u' on the other face of the wheel. It is, however, preferred to have it as described. In this way it will be seen that the carrying-wheel carries the blanks toward the jaws and inserts the blank in the open dies and moves it back to form the thread, and that these motions are repeated a given number of times until the thread is completely chased or cut, and that when completed the carrying-wheel is turned far enough around to remove the threaded screw and present a blank to the jaws to undergo the same series of operations. While the screw is being cut or chased, it is held in its hole in the rim of the carrying-wheel by means of a roller v' within the rim

of the wheel and turning on a stud-pin at the end of a lever w' , which turns on a fulcrum-pin x' , the roller being held against the inner periphery of the rim of the wheel by a pressure-screw y' , that bears against the lower end of the lever, so that as the blank is carried up by the wheel to be presented to the dies the pressure of this roller against the head holds it firmly in the rim of the wheel.

The machine can be made double for threading two screws at one and the same time, as shown in the drawings, by having two carrying-wheels on the same shaft and two mandrels, with their jaws, dies, and sliding rods, the two mandrels being geared together by two cog-wheels $z' z'$.

It will be obvious from the foregoing that, instead of the segment cog-wheel for giving the reciprocating motions to the carriage of the carrying-wheel, this may be done by a segment volute cam, the face of which shall act alternately against the front and back faces of the open space of the bar attached to the carriage, as the object is simply to give a regular reciprocating motion to the carriage, particularly during the operation of threading, for during that operation the motion of the carriage must be regular to give a regular pitch to the thread. As it is only important to give a regular motion to the carriage in the operation of threading, the segment-cog or the volute cam need only act in this direction, and the motion to run back the car-

riage for the presentation of the blank may be given by a separate cam of a more sudden curve, or an arm of greater length to perform the return motion faster; but as these are well-known mechanical equivalents they are simply named to indicate the various modes in which this part of my invention may be applied.

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

1. The carrying-wheel on the reciprocating carriage operated substantially as described, in combination with the dies in the jaws of the mandrel, substantially as described, whereby the stem of the screw is moved in and out for the chasing or cutting of the thread of the screw by a series of operations, as described.

2. The method of holding the blanks in the rim of the carrying-wheel by combining with the rim of the wheel the pressure-roller, substantially as described.

3. The method of increasing the depth of the cut of the chasers or dies in the jaws of the rotating mandrel for each cut in the series by the threading-cam, and the wedge-formed slide operated substantially as described, in combination with the carrying and holding wheel, as described.

JOHN CRUM.

Witnesses:

J. T. DEAN,

WESTEL W. POWELL.