

W. D. SLOAN.

Drilling and Milling Umbrella Tips.

No. 18,305.

Patented Sept. 29, 1857.

Fig: 1.

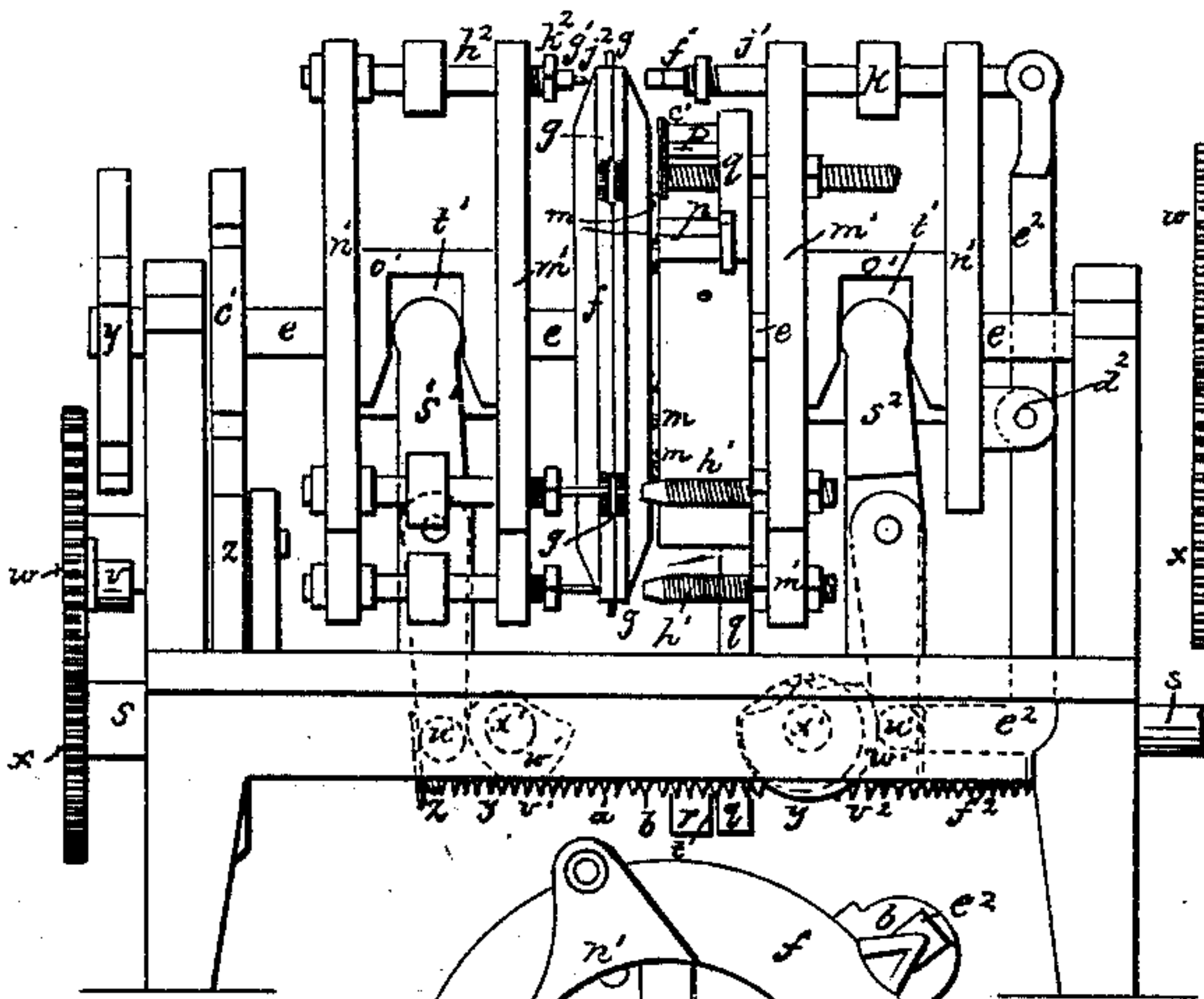


Fig: 3.

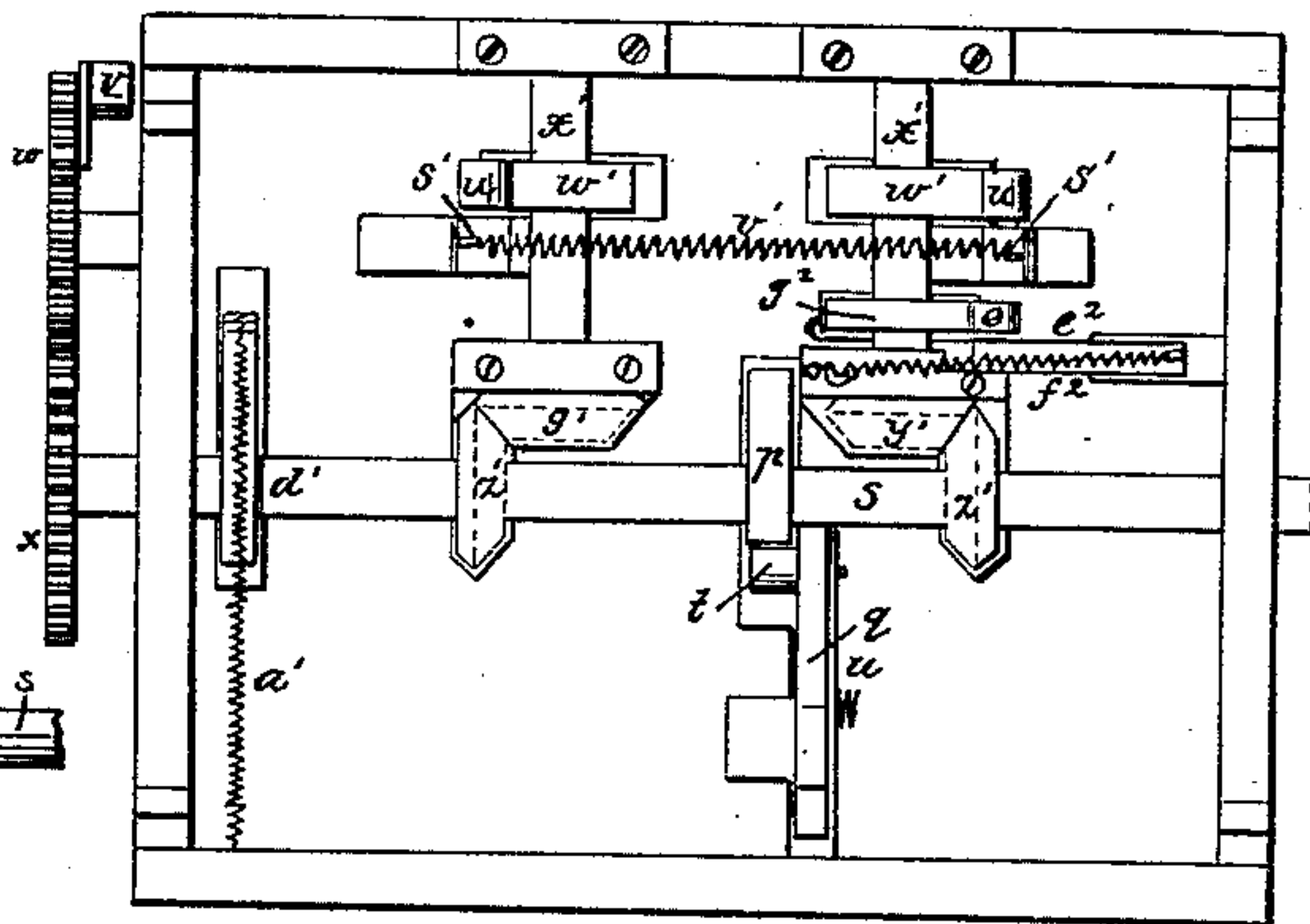


Fig: 2.

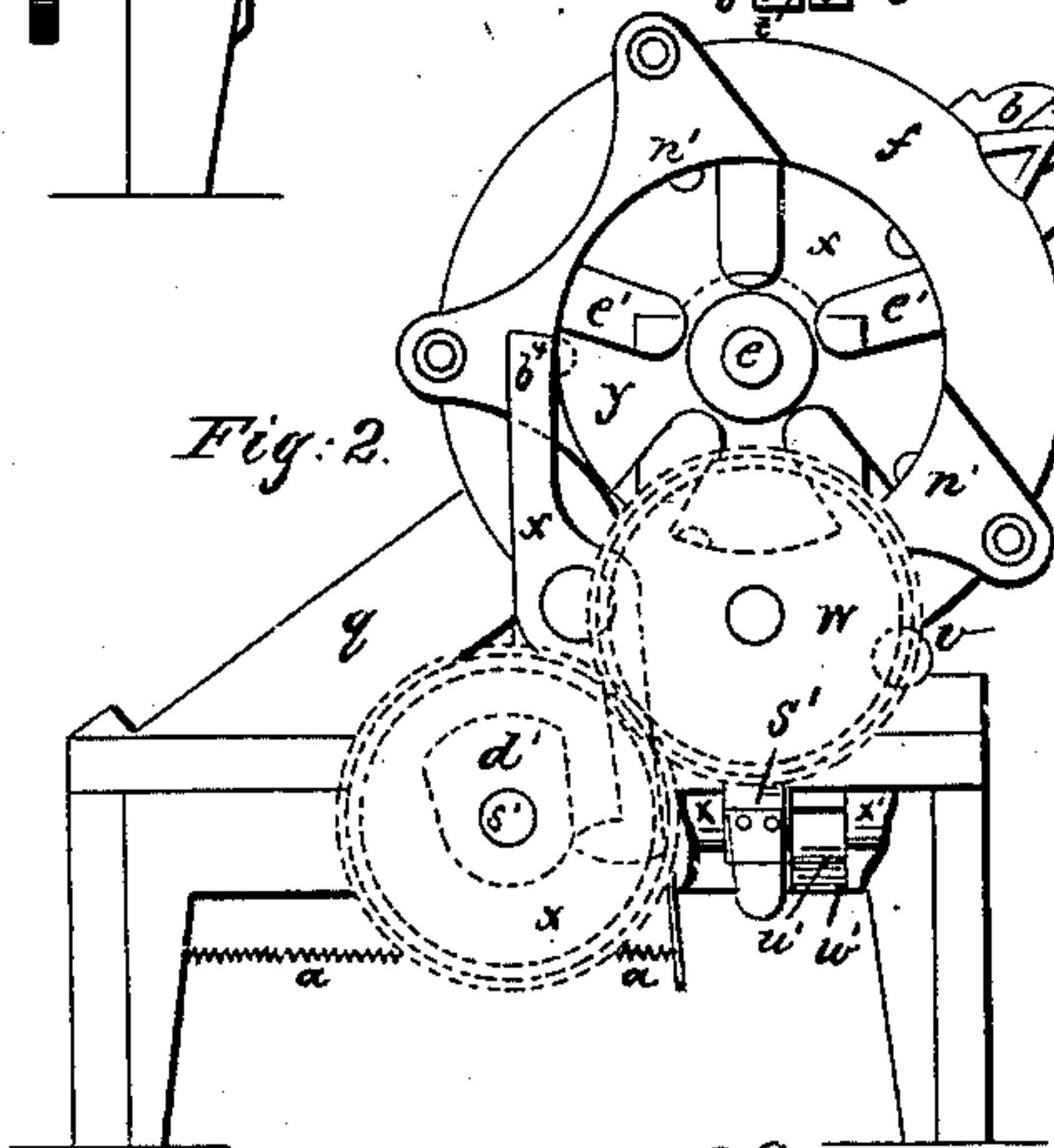


Fig: 4. a. h.

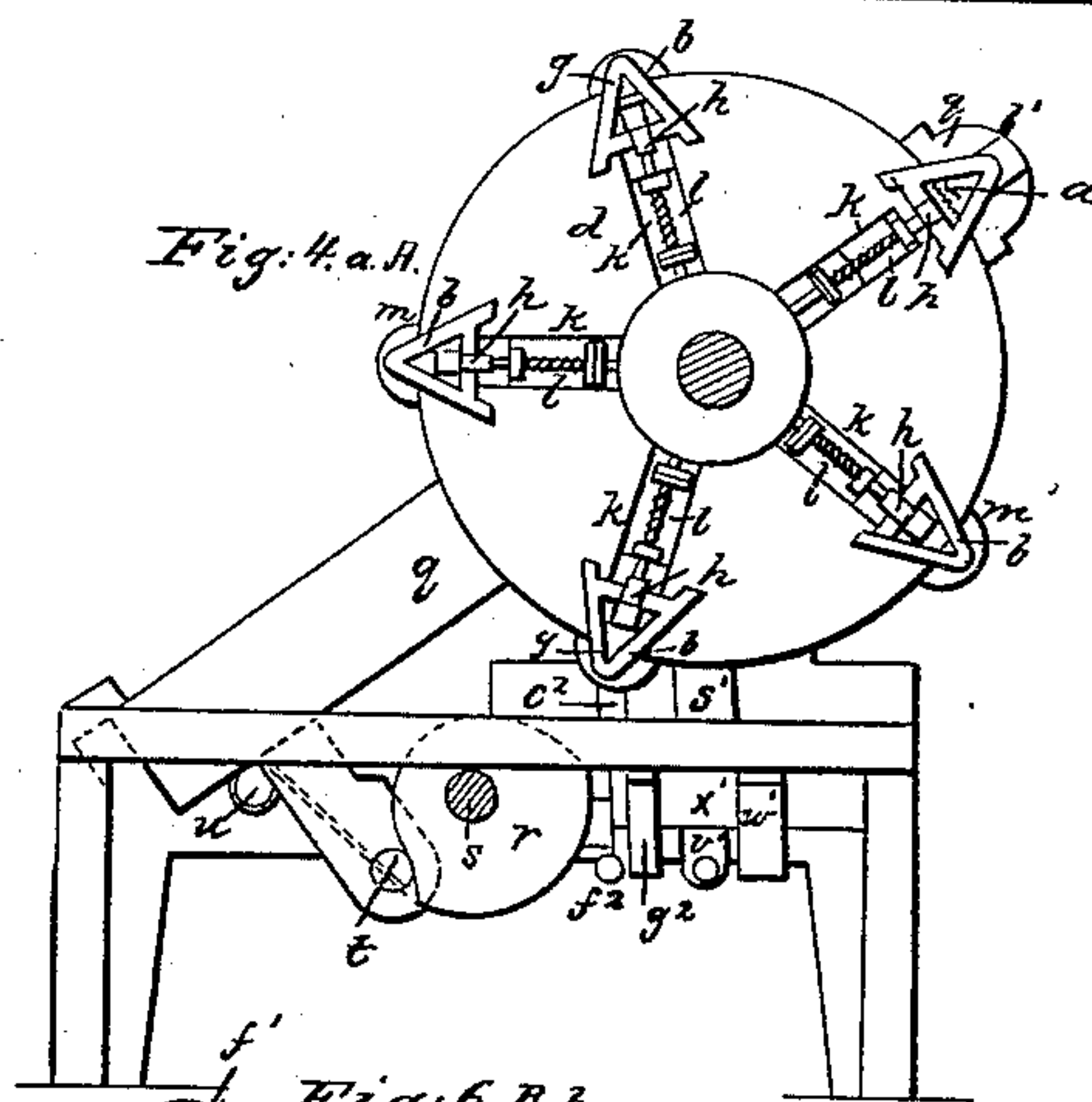


Fig: 6. B. b.

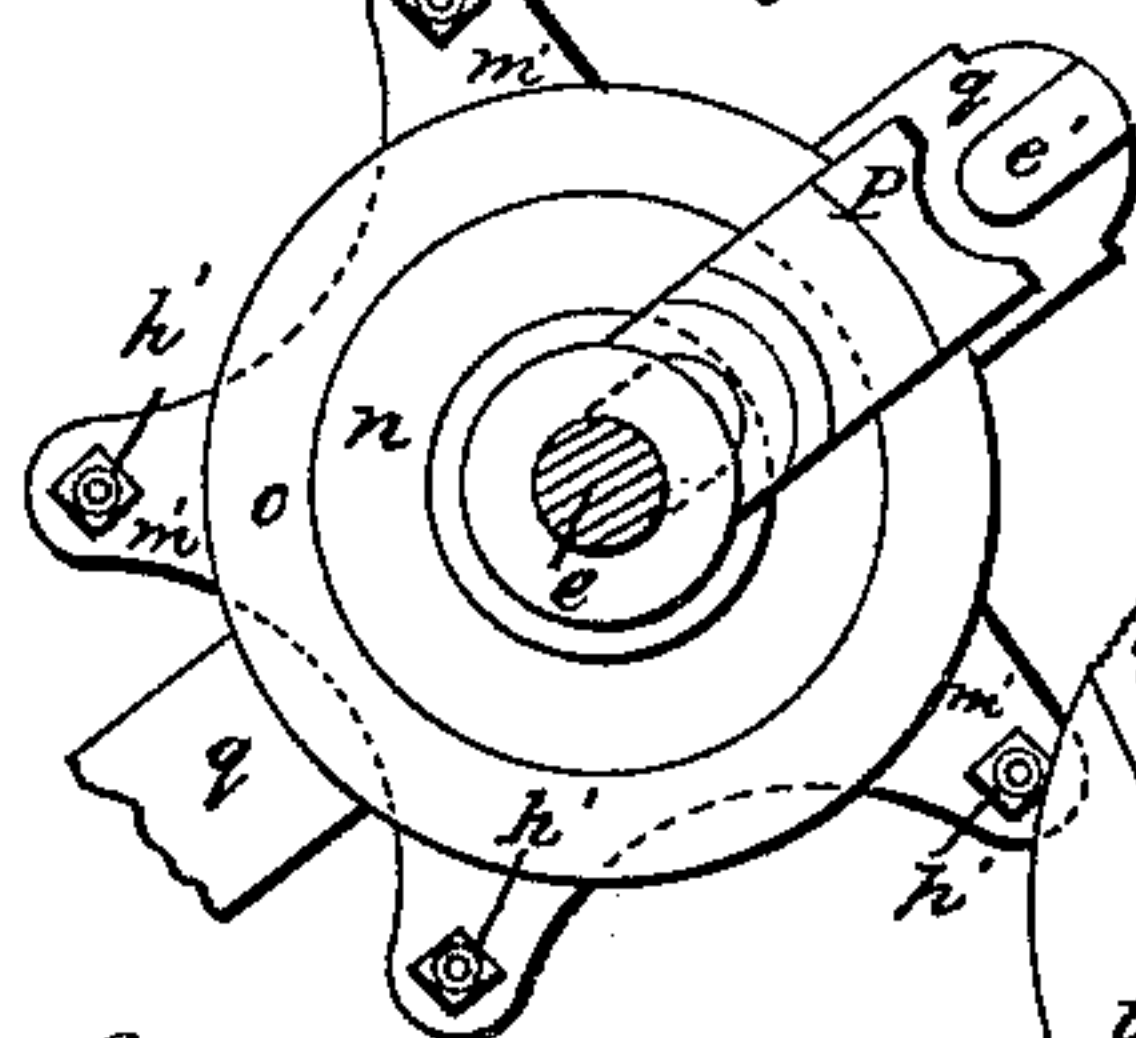


Fig: 5. A. a.

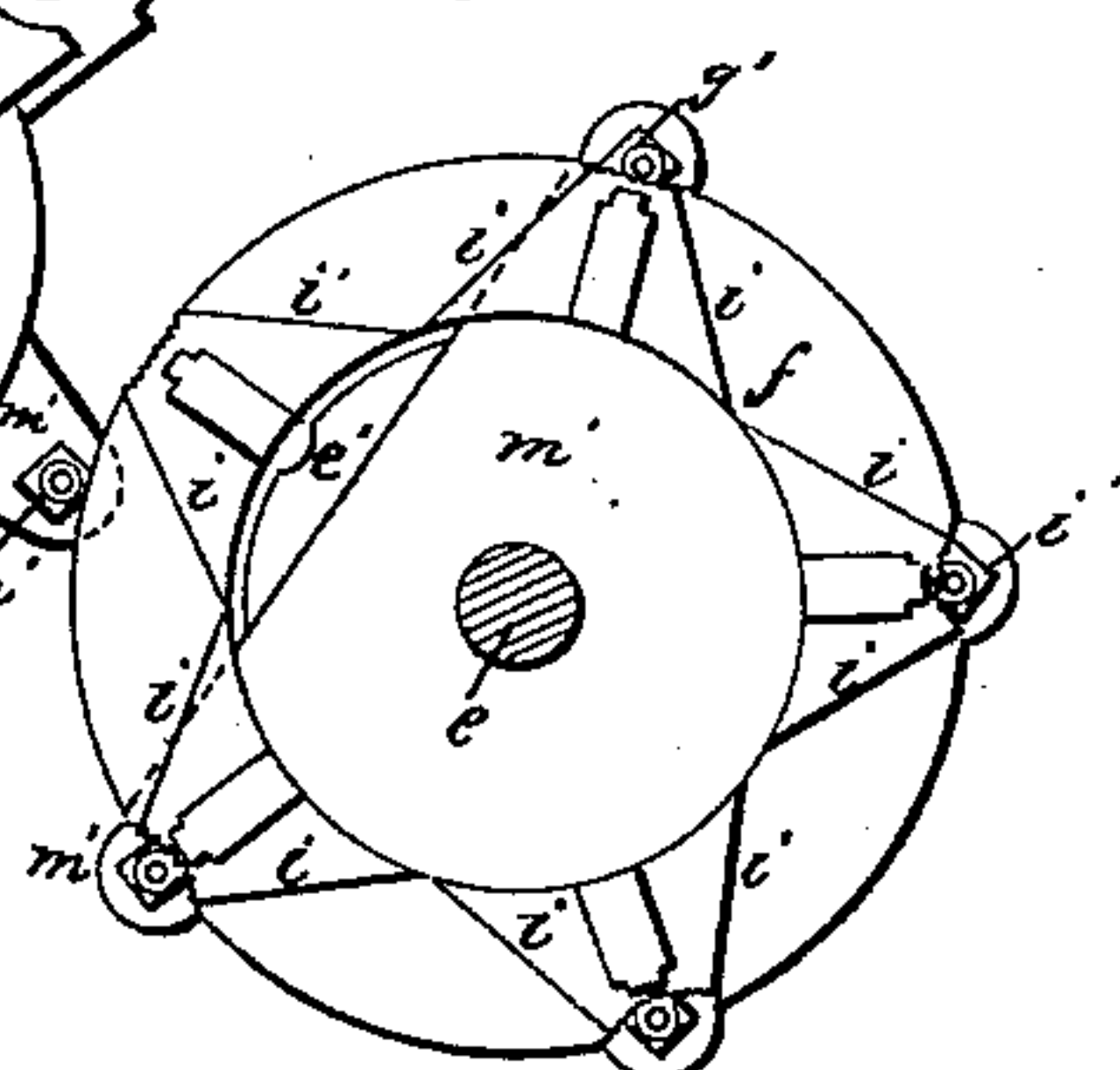


Fig: 7. B. b.

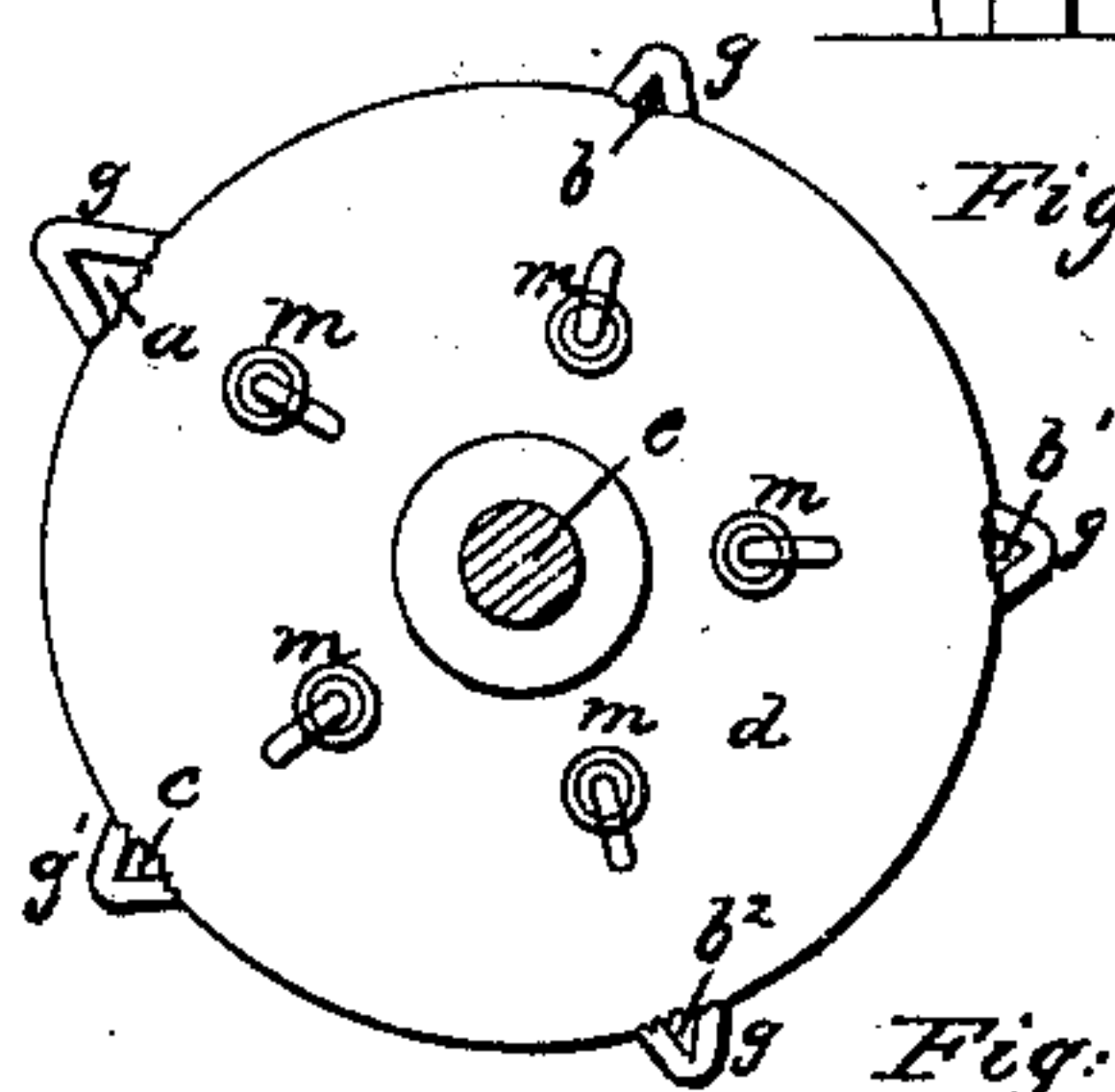


Fig: 9.

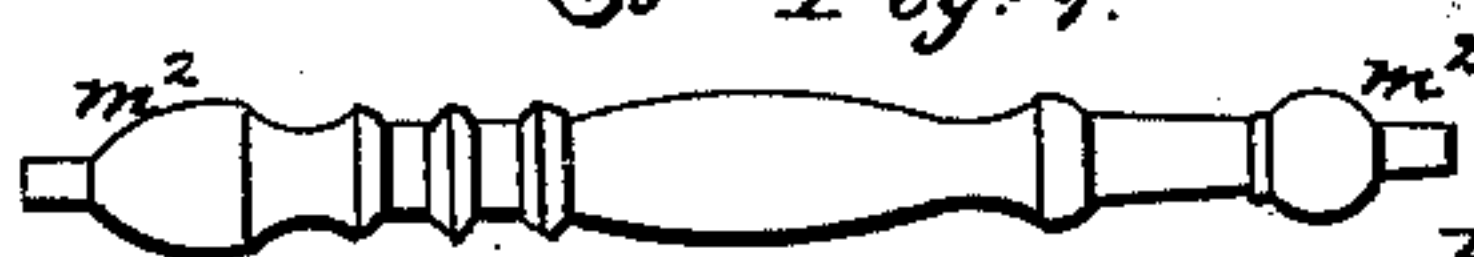


Fig: 8.

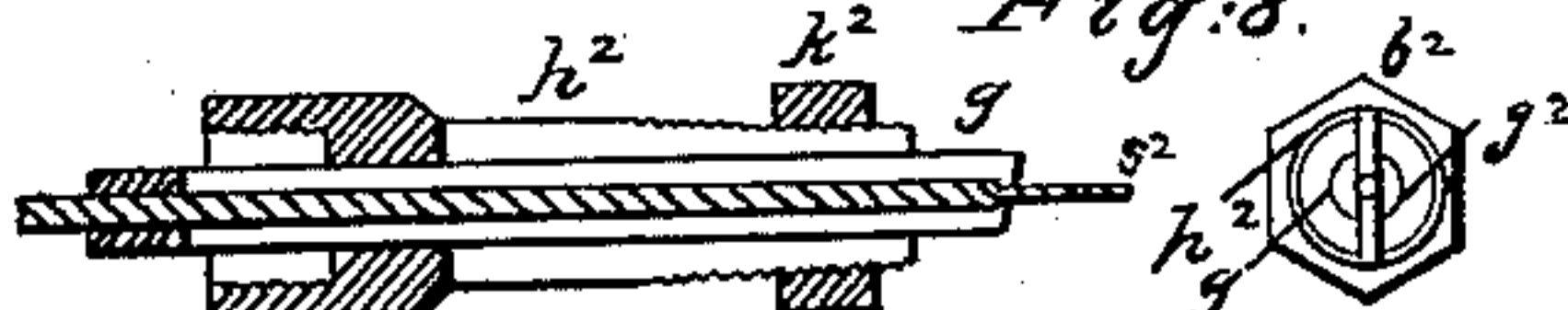
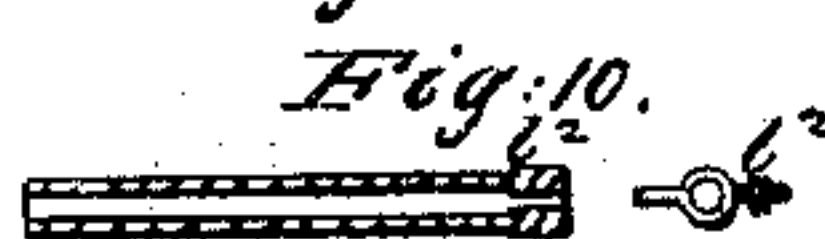


Fig: 10.



Witnesses:

W. A. B. L. S.  
J. S. Wilson

Inventor:  
W. D. Sloan.



# UNITED STATES PATENT OFFICE.

WM. D<sup>D</sup>. SLOAN, OF NEW YORK, N. Y.

## DRILLING AND MILLING MACHINE.

Specification of Letters Patent No. 18,305, dated September 29, 1857.

*To all whom it may concern:*

Be it known that I, WILLIAM D<sup>D</sup>. SLOAN, of the city, county, and State of New York, have invented certain new and useful Improvements in Machines for Drilling and Milling; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a front elevation; Fig. 2 an end elevation; Fig. 3 a bottom view; Fig. 4 a cross vertical section taken at the line A, *a* of Fig. 1 and looking to the right; Fig. 5 a like section taken at the same line A, *g*, and looking to the left; Fig. 6 another cross vertical section at the line B, *b* of Fig. 1, and looking to the right; Fig. 7 a like section taken at the same line B, *b*, and looking to the left; Fig. 8 a longitudinal section and end view of a mandrel with a milling and a drilling tool; Fig. 9 a separate view of a chair round; and Fig. 10 an end view and longitudinal section of a hollow tool.

The same letters indicate like parts in all the figures.

The object of my said invention is to mill or drill the two ends of blocks of various materials, such as umbrella tips, chair rounds, and a great variety of articles, with the view to expedite such operations and to produce accurate work.

I will describe my said invention as applied to drilling a hole in one end, and milling the two ends of blocks of ivory, bone, or other material for umbrella tips, preparatory to turning them, and as the turning of such tips is now done by machinery it is important that the hole drilled in one end should fit onto the umbrella stretchers when completed and so that they should all fit onto a mandrel in the process of turning, and that the opposite ends of such blocks should be milled so as to form the end or bulb of all such tips at the same distance from the hole so that they should all fit in the machine. This is not only important with the view to obtain uniformity of size, but especially so with the view to have all the blocks so drilled and milled that when the machine for turning them is set to receive and hold one, it shall receive and hold all the others with equal accuracy.

In the accompanying drawings (*a*) represents a block of bone just as it is about

to be secured in the machine and (*b*, *b'*, *b*<sup>2</sup>) three others each in different degrees of progress, and (*c*) one that is being finished. The blocks are roughly sawed to an approximate length and of irregular figure as represented. And the first object is to properly grip and hold them in the machine in the required line and so that they shall not yield and yet admit of being shifted from one to another of a series of tools to whose operation they are in turn to be subjected. These blocks are secured and held on the periphery of a wheel (*d*) on a horizontal shaft (*e*) mounted in suitable bearings on a bench or table. This wheel is made of two parts (*d*) and (*f*) the latter being merely a flat ring of the same external diameter with, and secured to the face of the part (*d*). The periphery of this wheel at given and equal distances apart, say five, more or less, is cut out to a slightly concave form and notched as represented, to receive the angles of the blocks, which are there gripped and held by a metallic stirrup (*g*). There are five of these stirrups which are formed each of a metal plate with an angular hole of sufficient size to receive freely the largest of the blocks. The plate is connected by a joint pin with the outer end of a rod (*h*) which slides radially in the wheel and when drawn inward toward the center of the wheel, will grip the block firmly against the periphery of the wheel, and as the triangular stirrup is connected to the rod by a joint pin it can yield to adapt its oblique sides to the irregular form of the block. The stirrups are fitted to work in cavities made in the wheel, the sides of these cavities being oblique, as at (*i*, *i*) so that when the stirrups are forced out preparatory to receiving a block these oblique sides act as guides to bring the outer angle of the stirrups in line with the several radial slots by which they are operated.

The rods (*h*) are connected with radially sliding plates (*k*) by passing through a projection thereof with a helical spring (*l*) interposed. The plates (*k*) have each a stem passing through a radial slot in the wheel to which is fitted a roller (*m*) on the outer face of the wheel (*d*), so that by forcing either one of the rollers out the stirrup connected with it will liberate its block, and by forcing the roller inward toward the shaft the stirrup will grip the block onto the periphery of the wheel; but as the blocks vary



in size, and the mechanism which acts on the roller has a positive motion, the spring (l) is interposed so as to yield to all such irregularities of size. Care must be taken to have the tension of these springs so great that they will hold the blocks firmly and resist all the forces to be applied to the blocks during the several operations.

The wheel (d) with its several stirrups is turned by an intermittent motion to shift the blocks from one position to another in the circle. At the position (a) a finished block is taken out and a fresh block put in, the wheel is then turned to bring this block to the first position (b) to be operated upon and there held the required length of time, and then to the next position and so on. During these motions the gripping stirrups are held in by the rollers (m) which travel in a concentric groove (n) in a fixed circular plate (o) through which the shaft passes; but as each stirrup is to be moved in and out when brought to the position (a) a section (p) of the plate (o) and its groove (n) is cut out radially and attached to a radially sliding bar (q) and so placed that the roller of each gripping stirrup shall be within this section (p) of the groove when brought to the position (a) so that by moving this section (p) outward the stirrup will be made to liberate a finished block, and when drawn inward, the stirrup will be made to grip a fresh blank. The above motion is imparted to the section of the groove by a cam (r) on the main driving shaft (s) which cam acts on a roller (t) near one end of the sliding bar (q) to which the section of the groove is attached. The form of the said cam is such as represented that so soon as either one of the stirrups is brought to the position (a), the cam permits the section to be forced out by the tension of a spring (u), and there to hold it until a finished block is taken out and another put in, and then the cam acts to force the section in to grip the block.

The intermittent motion to shift the blocks from one position to another is communicated by a wrist pin (v) on a spur wheel (w) which receives motion from the main driving shaft (s) by another spur wheel (x) of equal diameter. At each revolution this wrist pin enters one of a series of radial slots in a wheel (y) on the shaft (e) of the wheel (d), gradually starts it, and turns it to the required distance and comes out, and travels around to act on the next slot at the next operation. As it is important to hold the blocks steadily during the several drilling and milling operations, there is combined with the mechanism for shifting the blocks a stop or holdfast consisting of a lever (z) one arm of which is acted upon by the tension of a spring (a') to force a spur (b<sup>4</sup>) on the other arm of the

lever into either one of a series of recesses in the periphery of a wheel (c') on the said shaft (e), and the said lever is acted upon in the opposite direction to liberate the parts, just before the wrist pin begins to act, by a cam (d') on the main driving shaft.

Then a block is put in the machine its proper position is determined by the face of a gage plate (e'), which is adjustable for different lengths of blocks. When the block is brought to the position (b) its two ends are simultaneously acted upon by suitable rotating cutters (f', g') one of which (f') mills one end to form a section of a sphere, while the other (g') mills the other end of the block and partly drills the hole. After these two opposite tools have advanced to perform their work, and retired, the block is shifted to the next position (b') where it is acted upon by a rest or concave center (h'), see Fig. 6, which is brought up to act as a support while a drill (i'), see Fig. 5, is brought up at the other end to drill the hole deeper. And when these have returned the block is shifted in succession to the other positions (b<sup>2</sup>) and (c) where at each position a like support is brought against one end and a drill at the other to complete the drilling.

The milling tool or cutter (f') projects from the end of a mandrel (j') which carries a pulley (k') to receive a belt from some first mover to give it the required rotary motion. This mandrel is mounted in the arms of two plates (m', n') connected by a central hub (o') which slides longitudinally on the shaft of the wheel (d). The plate (m') has three arms which carry the hollow centers or rests (h'). The moment the blocks have shifted position by the turning of the wheel (d) the hub (o') with its two plates (m', n') carrying the mandrel (j') and rests (h') is moved toward the wheel (d) to force the cutter (f') against the end of one block to mill it, and the rests (h') against the milled ends of three other blocks. This is done by a lever (s') the upper arm of which is bifurcated to embrace the hub (o') and to be received within grooves (t') of the hub, so that the vibrations of the lever will carry the whole of this apparatus toward or from the wheel (d). The other arm of the lever carries a roller (u') which is held by the tension of a spring (v') against the periphery of a cam (w') on a cross shaft (x') which receives motion from the main driving shaft by two beveled cog wheels (y', z'). This cam is of such form as to force the entire apparatus toward the wheel (d) as soon as the blocks have been shifted, and there hold it and at the end of the operation to permit the tension of the spring to draw it back preparatory to the shifting of the blocks.



The outer end of the mandrel is connected by a collar with the forked end of a lever ( $c^2$ ) which turns on a fulcrum pin ( $d^2$ ) connected with the plate ( $n'$ ) so that when  
 5 the entire apparatus is moved toward the wheel ( $d$ ) this lever and the mandrel will also be moved; but as the hollow centers or rests ( $h'$ ) when brought against the spherical end of the blocks must be held there,  
 10 which is done by the form of the cam ( $w'$ ), and the milling tool must continue to be moved up to effect its cut, the lower end of the lever ( $c^2$ ) carries a roller ( $e^2$ ) which is held by the tension of a spring ( $f^2$ ) against  
 15 the periphery of another cam ( $g^2$ ) on the cross shaft ( $x'$ ), and to give the gradually advancing motion to the mandrel of this tool the cam is in the form of a volute as represented.  
 20 On the opposite side of the wheel ( $d$ ) there is a similar apparatus constructed and operated in the same manner, and indicated by the same letters, and receiving motion from the main shaft by corresponding  
 25 parts; but without the additional lever ( $c^2$ ) and cam ( $g^2$ ). And the cam ( $w'$ ) on this side is a regular volute to cause the entire apparatus on this side to move up by a regular motion until the end of the operation, and then it suddenly runs in to the  
 30 place of beginning to permit the tension of the spring to draw back the entire apparatus that the blocks may be shifted. Another difference is that the two plates ( $m'$   
 35  $n'$ ) have an equal number of arms in which are mounted mandrels that carry each a pulley to receive a belt from some first mover to rotate them at a high velocity depending on the kind of material to be  
 40 worked. The mandrel ( $h^2$ ) on this side which corresponds to the mandrel ( $j'$ ) on the other side, carries a milling tool ( $g'$ ) and a drill ( $j^2$ ). And for this purpose the inner end of the mandrel is hollow (as represented in the separate Fig. 8) and split to  
 45 receive the milling tool ( $g'$ ) freely, which is then firmly gripped by turning a nut ( $k^2$ ) which is tapped on the end of the mandrel made tapering for that purpose. The outer  
 50 end of the milling tool is formed with cutting edges to mill the end of the blocks around the bore to the required form whatever that may be. This tool is itself hollow to receive the shank of the drill ( $j^2$ ), and  
 55 split nearly the entire length so that when the nut ( $k^2$ ) is turned either to liberate or to grip the milling tool the drill will also be either liberated or gripped. The other mandrels are made in the same manner but  
 60 simply to receive a drill. The drills on the successive mandrels are made longer and larger that each may in succession increase the size of the hole in the blocks, so that, as the machine is mounted, the hole in each  
 65 block will be completed by four successive

operations, although one finished block is discharged at the end of each operation.

From the foregoing it will be seen that blocks for umbrella tips prepared in a machine on the above plan will be all alike,  
 70 with the hole of the same depth and diameter, and at precisely the same distance from the spherical end, so that they can afterward be turned in a machine having a tapered mandrel to fit in the hole and a hollow  
 75 center with a positive motion toward the mandrel to hold the blocks while being turned without the necessity of a self adapting mechanism which is indispensable when the blocks are not accurately prepared.  
 80 And although I have above described my said invention as applied to the preparation of blocks for umbrella tips I do not wish to be understood as limiting my claim of invention to such use as it is equally applicable  
 85 to the preparation of blocks for a great variety of other purposes, such, for instance, as chair rounds, banister rods, and various other articles such as seat sticks, and so forth, used in the construction of carriages.  
 90 Nor do I wish to be understood as limiting myself to the use of any peculiar kind of cutters, drills, and milling tools, as these may be changed at pleasure to suit the kind of work desired. Nor do I wish to limit  
 95 myself to the use of mandrels on one side of the blocks and centers or rests on the other, as the mandrels may be all on one side, and the rests on the other, or all mandrels on both sides, or some mandrels and  
 100 some rests on each side.

When the machine is applied to the preparation of chair rounds or such like articles, as represented in Fig. 9 the mandrels should  
 105 be hollow as represented in Fig. 10 which presents an end view and a longitudinal section, with the cutter ( $l^2$ ) attached so as to present the cutting edge inward, the cutter being suitably formed to give the required shape up to and including a part of  
 110 the ornaments ( $m^2$ ,  $m^2$ ). The cutter instead of being at the inner end alone may extend the whole length of the part to be worked from either end, as in the case of cutting tapered rounds. But it is deemed to  
 115 be unnecessary to point out all the varieties of form, and modification which may be adapted within the range of my said invention, as the skilful mechanic will have no difficulty in making all the variations to suit  
 120 the kind of work required to be done.

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

1. The mode of operation, substantially as described, for securing and holding the  
 125 blocks onto the periphery of the wheel by which they are shifted from place to place, which mode of operation results from the combination of the radially sliding stirrups, or their equivalents with the wheel, and the  
 130



mechanism operating the said stirrups to liberate and grip the blocks, or any equivalent therefor, substantially as described.

2. I also claim connecting the stirrups  
5 or any equivalent therefor with the radially sliding rods by a yielding joint in combination with the oblique edges of the recesses in which they slide, or any equivalent therefor, as set forth so that the said stirrups  
10 when forced out shall be brought in a radial position, and be free to yield laterally to any irregularity of form of the blocks to be gripped when drawn in, as set forth.

3. I also claim in combination with the carrying wheel, or equivalents therefor, for 15 holding and shifting the blocks, the two sets of hollow mandrels with appropriate cutters and having a reciprocating motion in opposite directions for acting on the opposite ends of the blocks, substantially as and for 20 the purpose specified.

WM. Dd. SLOAN.

Witnesses:

WM. H. BISHOP,

JOEL B. WILSON.