

No. 717,187.

Patented Dec. 30, 1902.

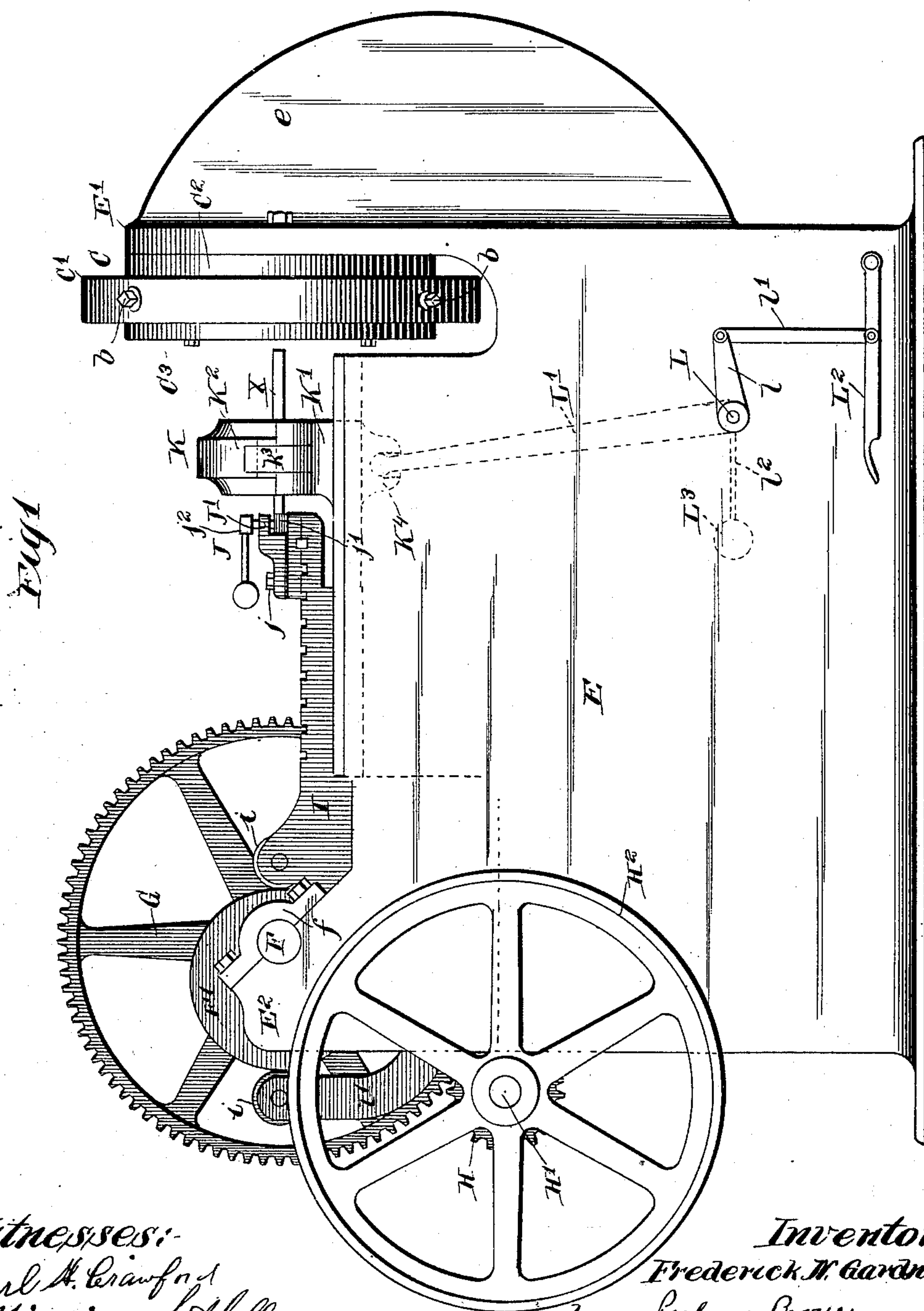
F. N. GARDNER.

MACHINE FOR GROOVING TAP BLANKS.

(Application filed July 1, 1901.)

(No Model.)

4 Sheets—Sheet 1.



Witnesses:-

Carl H. Crawford

William Hall.

Inventor

Frederick W. Gardner

by Poole & Brown

The Attorneys

No. 717,187.

Patented Dec. 30, 1902.

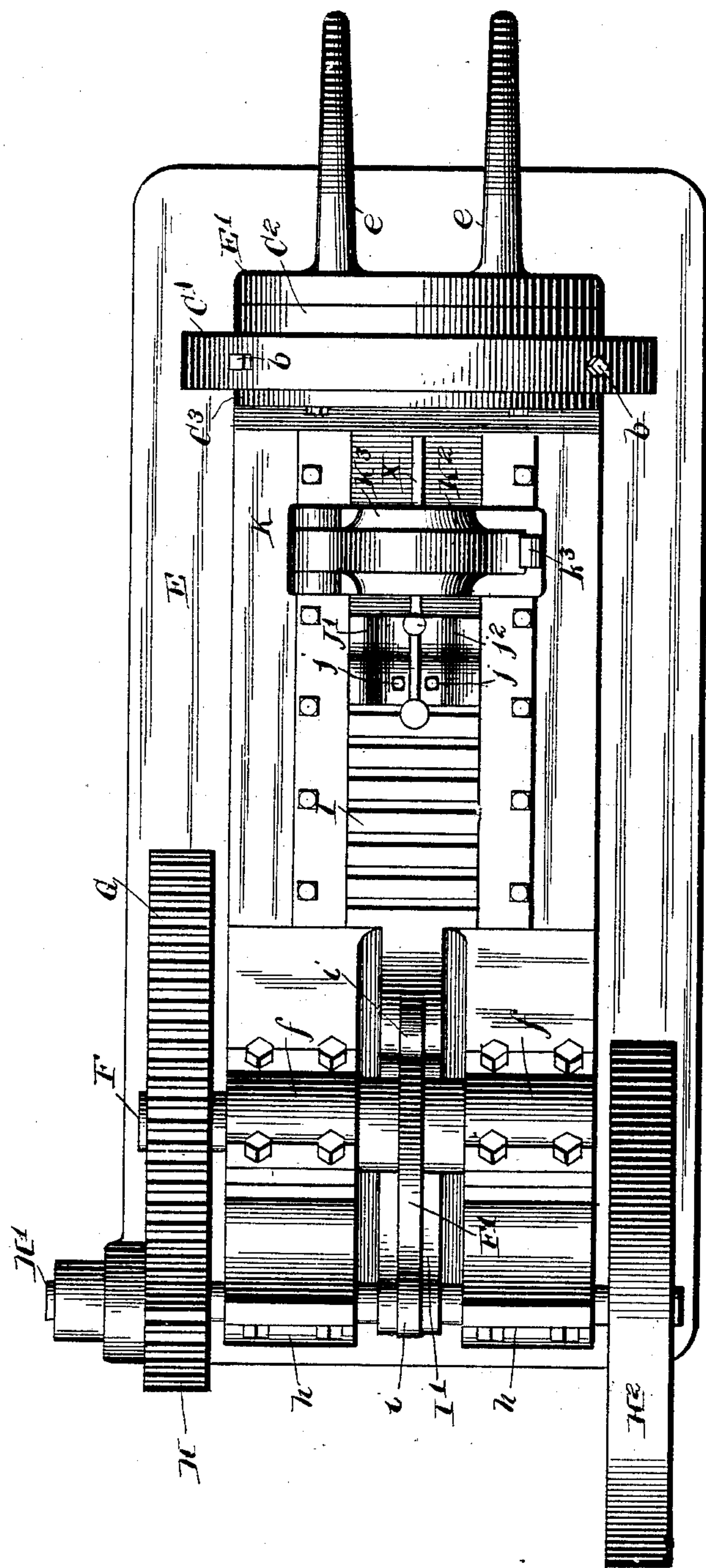
F. N. GARDNER.
MACHINE FOR GROOVING TAP BLANKS.

(Application filed July 1, 1901.)

(No Model.)

4 Sheets—Sheet 2.

Fig. 2



Witnesses:-

Carl St. Crawford
William Hall

by

Pooler & Brown

Inventor:-

Frederick N. Gardner

his Attorneys

No. 717,187.

Patented Dec. 30, 1902.

F. N. GARDNER.
MACHINE FOR GROOVING TAP BLANKS.

(Application filed July 1, 1901.)

(No Model.)

4 Sheets—Sheet 3.

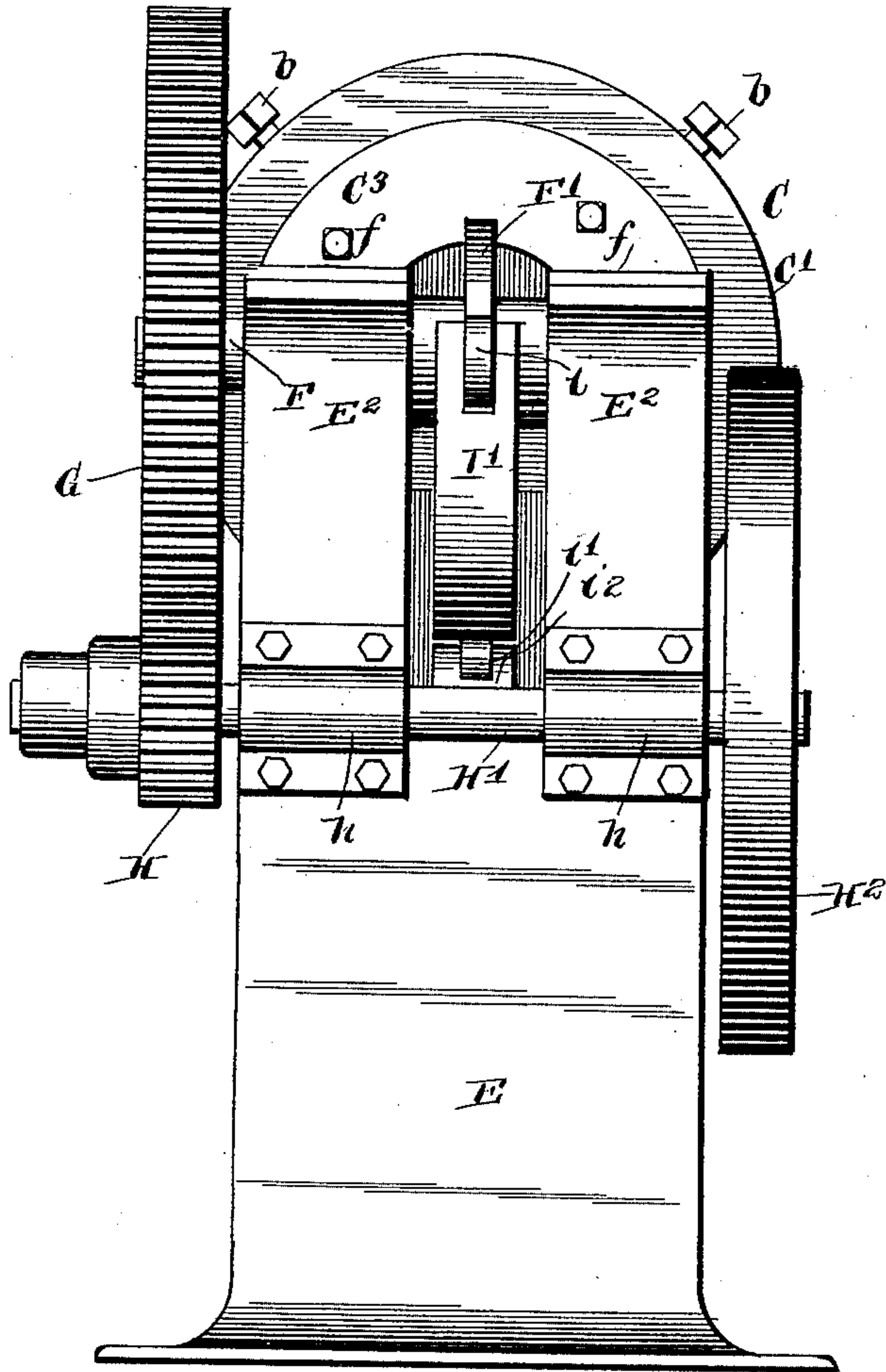


Fig 3

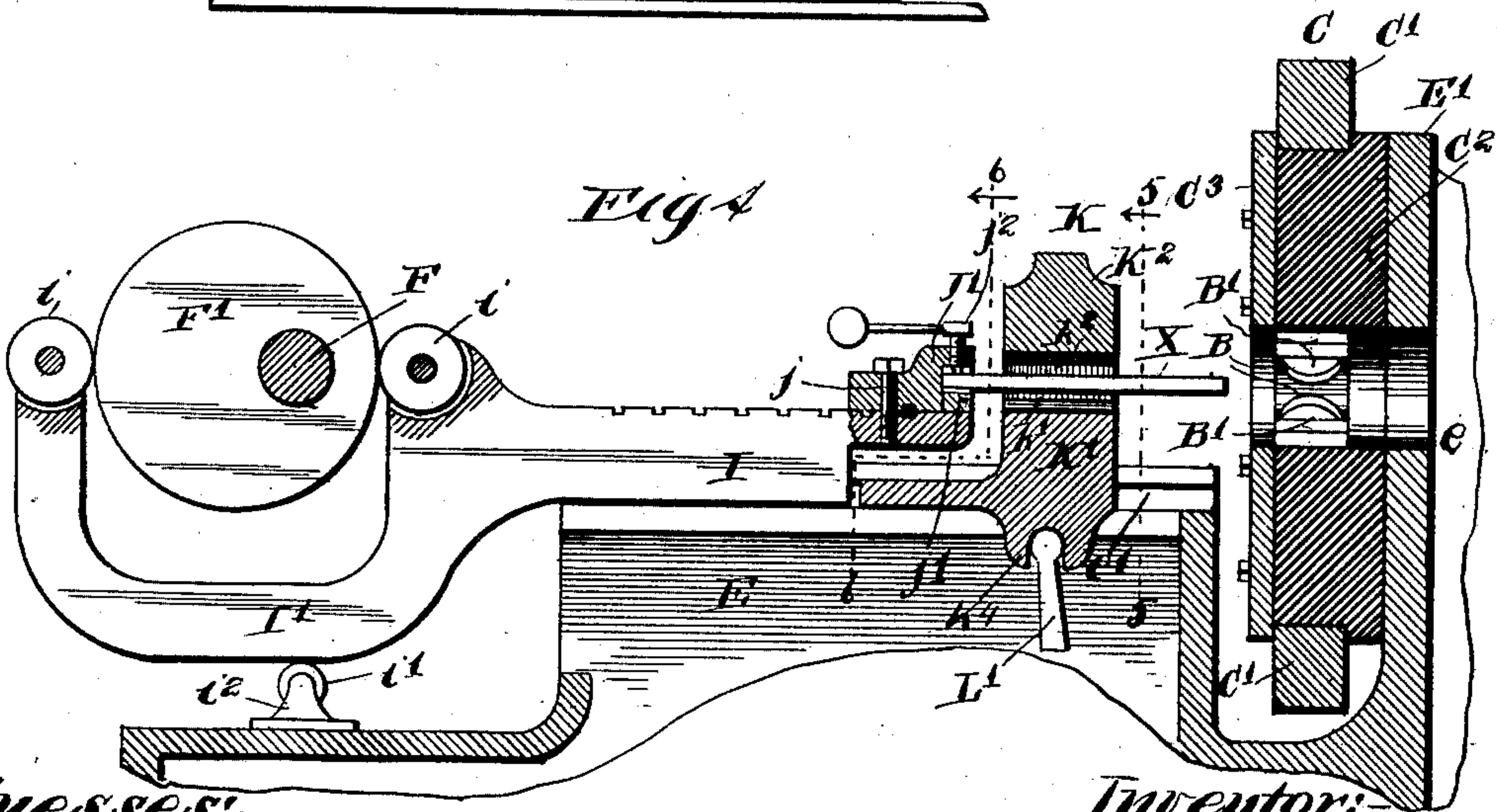


Fig 4

Witnesses:

Carl H. Crawford
William Hall

by

Frederick N. Gardner
Poole & Brown

His Attorneys

No. 717,187.

Patented Dec. 30, 1902.

F. N. GARDNER.

MACHINE FOR GROOVING TAP BLANKS.

(Application filed July 1, 1901.)

(No Model.)

4 Sheets—Sheet 4.

Fig 5

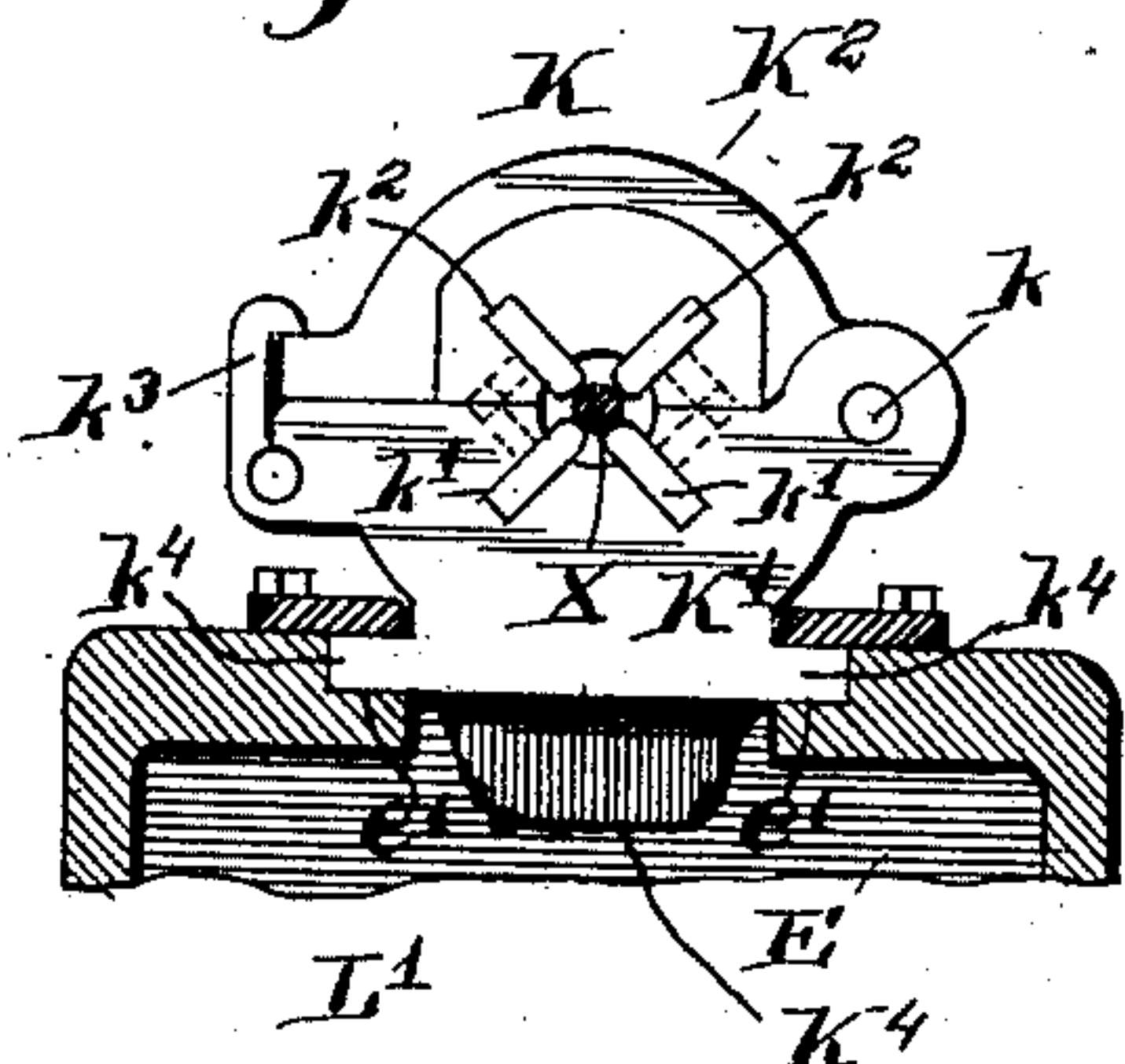


Fig 6

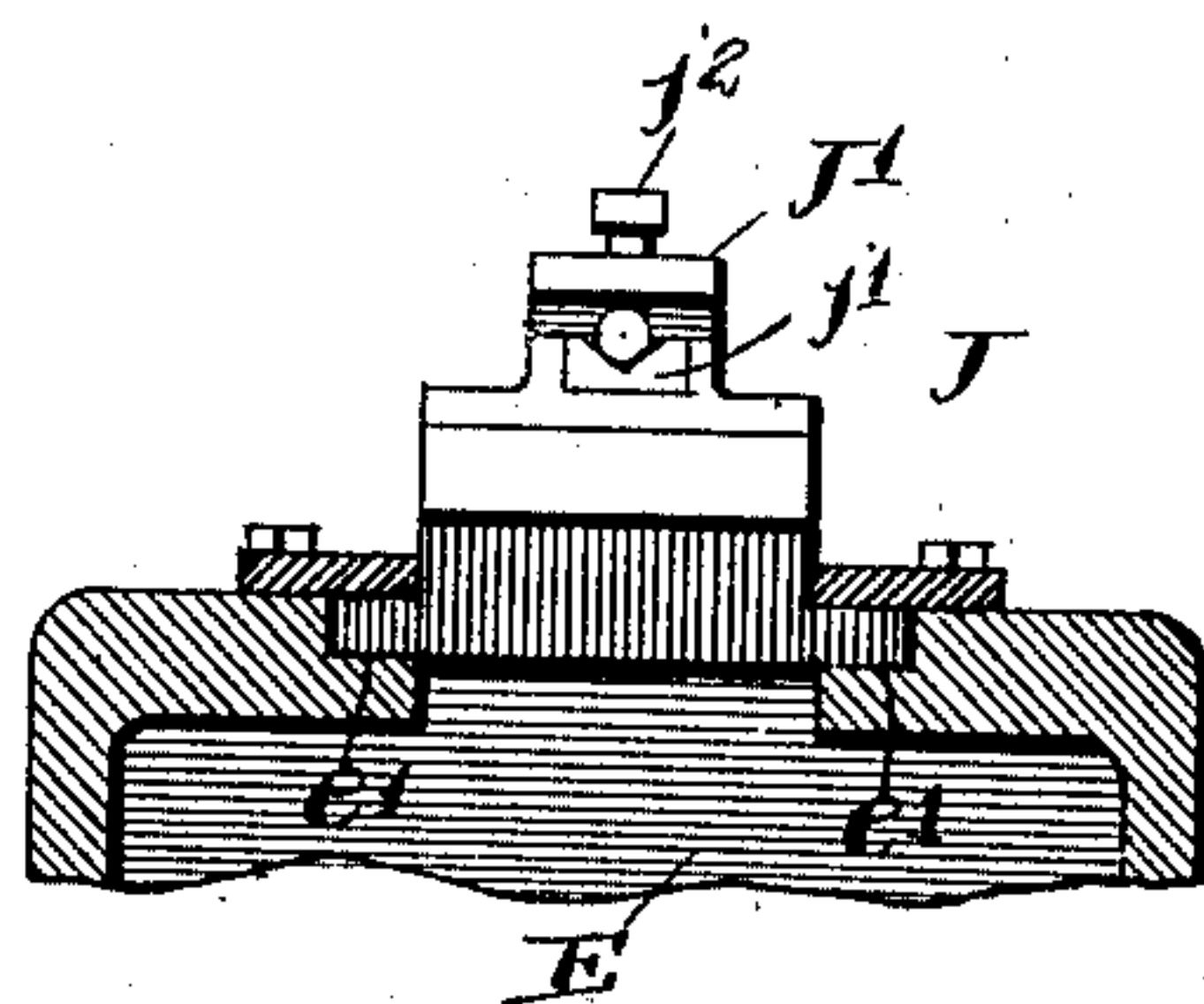


Fig 7

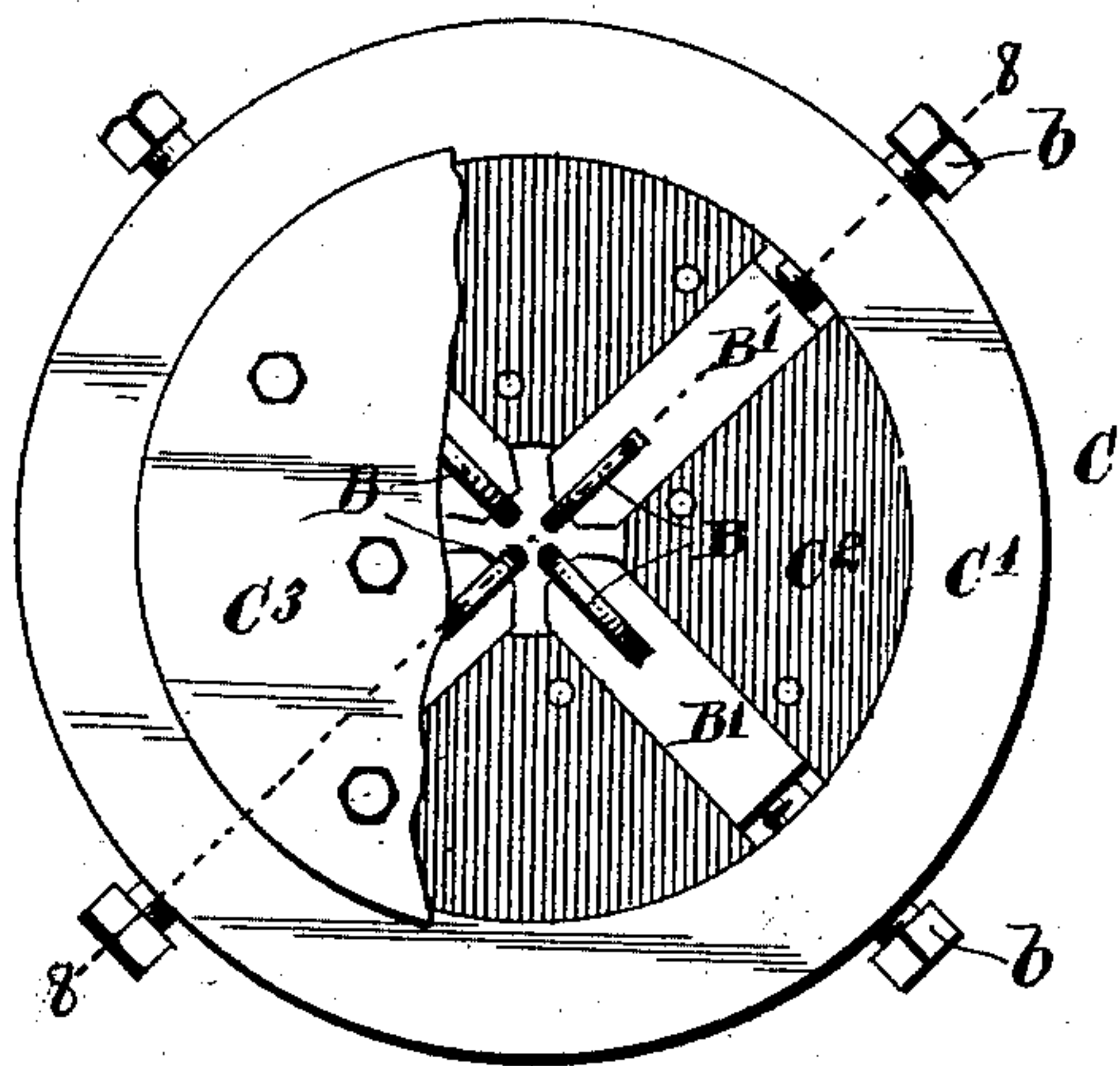


Fig 8

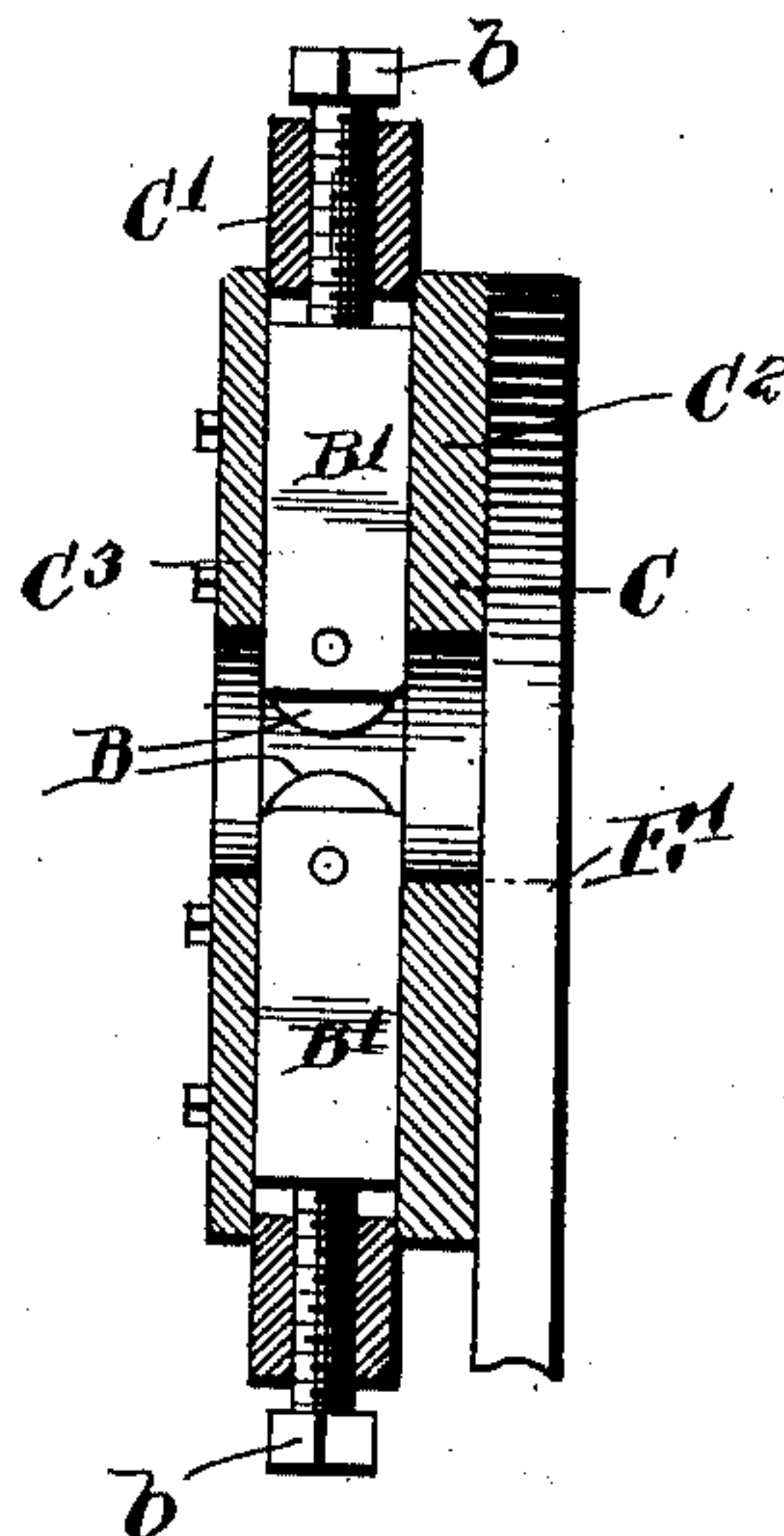


Fig 9

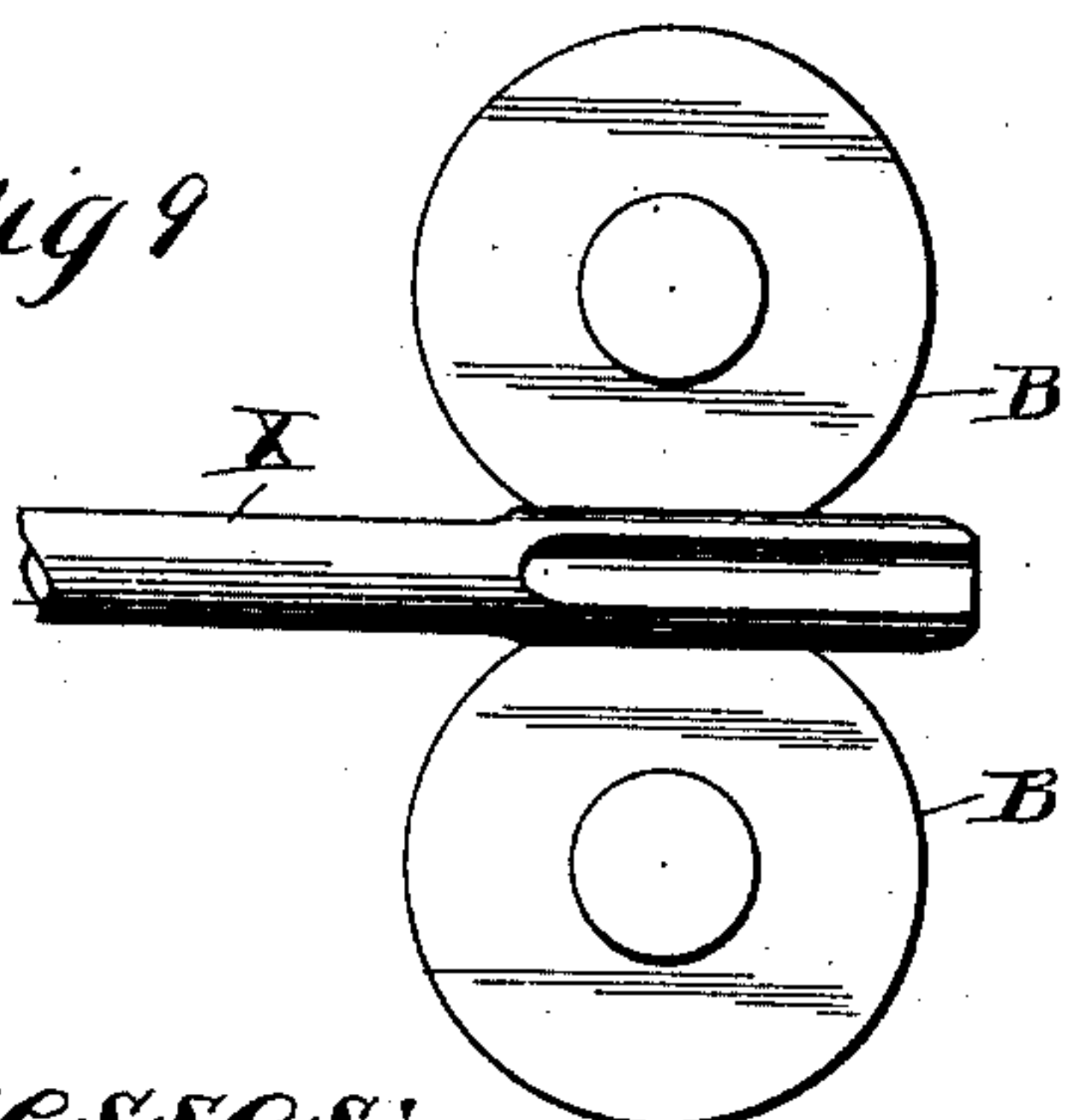
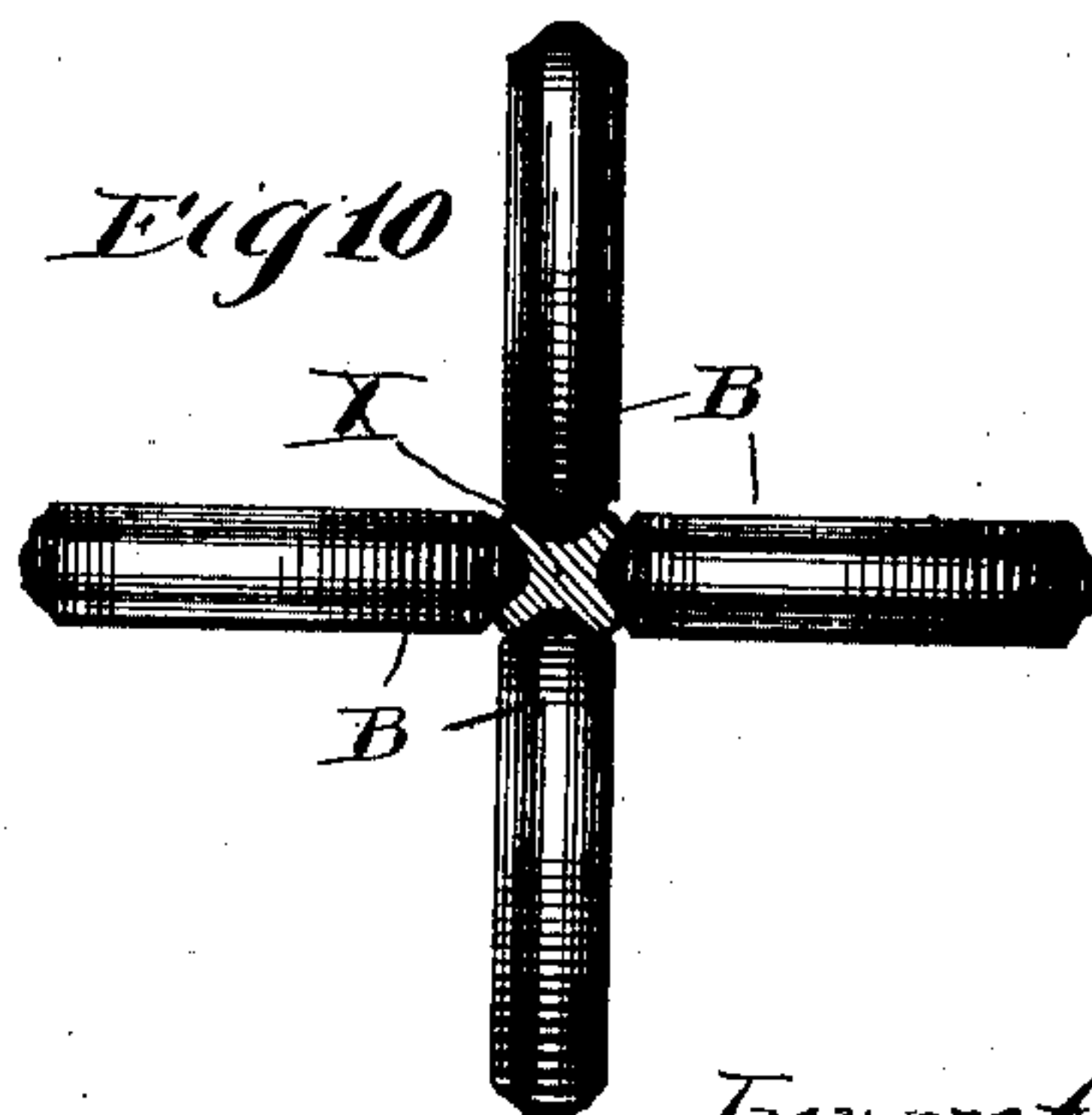


Fig 10



Witnesses:-

Carl M. Crawford
William H. Hall.

Inventor:-

Frederick N. Gardner

by Poole & Brown

his Attorneys

UNITED STATES PATENT OFFICE.

FREDERICK N. GARDNER, OF BELOIT, WISCONSIN, ASSIGNOR TO CHARLES H. BESLY, OF CHICAGO, ILLINOIS.

MACHINE FOR GROOVING TAP-BLANKS.

SPECIFICATION forming part of Letters Patent No. 717,187, dated December 30, 1902.

Application filed July 1, 1901. Serial No. 66,654. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK N. GARDNER, of Beloit, in the county of Rock and State of Wisconsin, have invented certain new and
5 useful Improvements in Machines for Grooving Tap-Blanks; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of
10 reference marked thereon, which form a part of this specification.

This invention relates to a novel machine for manufacturing blanks for screw-taps of that class provided with a plurality of sym-
15 metrically and longitudinally disposed ribs or lands separated by a like number of clearance-grooves, said ribs or lands being adapted to be provided on their outer faces with cutting-teeth.
20 The invention consists in the matters hereinafter described, and pointed out in the appended claims.

In the accompanying drawings, illustrating my invention, Figure 1 is a side view of a machine embodying my invention. Fig. 2 is a
25 top or plan view of the said machine. Fig. 3 is an end view of the machine. Fig. 4 is a detail longitudinal section through the working parts of the machine. Fig. 5 is a sectional
30 elevation illustrating the dies for guiding the blank, taken on line 5 5 of Fig. 4. Fig. 6 is a sectional elevation showing the clamp for holding the blank, taken on line 6 6 of Fig. 4.
Fig. 7 is a face view of the supporting means
35 for the swaging-rollers of the machine. Fig. 8 is a sectional view of the same, taken on line 8 8 of Fig. 7. Fig. 9 is a detail view showing in side elevation two of the swaging-
40 rollers with a partly-completed blank in position between the same. Fig. 10 is an enlarged sectional view through the blank, illustrating the position of the swaging-rollers with respect thereto in the operation of forming the blank.

45 The machine herein shown as embodying my invention embraces as its general operative features a reciprocating blank-holder, (indicated as a whole by J,) a plurality of stationary rotative grooving-rollers B B B, which
50 are supported in a holder, (indicated as a whole by C,) and a longitudinally-movable

guide for the blank, (indicated as a whole by K.) The reciprocating blank-holder acts when advanced to thrust the blank held therein through or between the grooving-rolls, 55 which are arranged radially with respect to the blank, and the guide is adapted to be moved close to the rollers to guide or center the blank as it enters between the same and to be retracted from said rollers with the 60 blank in the rearward movement of the blank-holder.

As shown in said drawings, E indicates the frame of the machine, which, as herein shown, consists of a single casting, on which the sev- 65 eral operative parts are mounted. Said frame is provided at one end with a rigid transverse supporting-plate E', which rises above the level of the top of the frame and is rigidly supported by vertical stiffening-ribs *ee*. At- 70 tached to the inner face of the standard E' is the roller-holder C, in which is supported the grooving-rollers B B, said holder being generally of annular or circular form. Said holder consists generally of an exterior ring 75 C', a circular plate C², which is attached rigidly to the inner face of the supporting-plate E', which has an annular seat for said ring on its outer margin and which is provided with four radial passages, in which are lo- 80 cated four radially-arranged supporting-bars B', in the inner ends of which the grooving-rollers B are mounted. The said roller-holder is also provided with a face-plate C³, which is secured to the face of the plate C' and which 85 serves to hold in the said radial guide-grooves the several supporting-bars B'. The plates C² C³ are provided with central openings, through which the blanks are inserted when thrust toward the grooving-rollers B. To af- 90 ford radial adjustment of the said swaging-rollers, set-screws *b b* are inserted through the ring C', so as to bear inwardly against the outer ends of the supporting-bars B'.

At the end of the frame E remote from 95 that at which the grooving-rollers are located is mounted a transverse shaft F, the same being supported in bearings *ff* upon upwardly-projecting portions E² E², located at either side of said frame and extending to the 100 level of the top of the main or central portion of the frame. Attached to said shaft be-

tween the parts E^2 of the frame is an eccentric F' , and secured in the end of said shaft outside of the frame at one side thereof is a gear-wheel G , which intermeshes with a gear-
 5 pinion H , mounted on a counter-shaft H' , which counter-shaft is mounted in bearings $h h$ on the end of the frame and is provided with a belt-pulley H^2 , by which motion is given to the operative parts of the machine.
 10 On the frame E between the shaft G and the grooving-rollers is located a horizontally-sliding bed or carriage I , the same being, as herein shown, engaged at its side edges with longitudinal guide-grooves $e' e'$, formed at
 15 either side of the top plate of the frame. Said carriage I is provided adjacent to the shaft F with a yoke I' , which extends around said shaft and is provided at either side of the eccentric F' with two antifriction-rollers
 20 $i i$, arranged to have contact with the diametrically opposite sides of said eccentric, said rollers $i i$ being located at the same horizontal plane with the axis of the shaft F . The yoke I' is supported beneath the shaft
 25 by means of an antifriction-roller i' , mounted in a bracket i^2 , attached to the base A below the said shaft.

The carriage I serves as a support for the blank-holder, which is carried or moved by
 30 said carriage and is made adjustable thereon. Said blank-holder consists of a body or casting J , (shown more clearly in Fig. 6,) which is secured to the carriage I by means of transverse grooves in the contact-faces by
 35 bolts $j j$. The blank-holder is provided with a clamping jaw or die j' , inserted in a recess in the lower part thereof and provided in its upper face with a V-shaped notch. Said holder is provided with an overhanging rigid
 40 arm J' , which projects over the said die j' and is provided with a clamping-screw j^2 , which acts in opposition to the V-shaped notch in the die and serves, in connection with the die, to clamp or hold the end of the blank to
 45 be operated upon. The clamping-die j' is made removable from the body of the holder in order to provide for holding blanks of different sizes or diameters, the dies used having V-shaped notches of varying sizes to cor-
 50 respond with the difference in the sizes of blanks to be used in or operated upon by the machine.

In the operation of the machine embracing the parts above described the carriage is given
 55 movement through the action of the eccentric F' , so as to carry the blank (indicated by X) endwise toward and between or away from the grooving-rollers, which rollers act when the blank is advanced and forced be-
 60 tween said rollers to form longitudinal grooves in the blank in the manner indicated in Figs. 9 and 10. The rounded peripheral surfaces of the grooving-rollers act to displace the metal of the blank and force the same out-
 65 wardly in its parts between the grooves in such manner as to form ribs or longitudinal

projections, said ribs extended outwardly beyond the original cylindric surface of the blank.

In addition to the features above referred 70 to the machine illustrated includes a longitudinally - movable centering - guide, indicated as a whole by K , which serves to center or accurately hold in position the blank with respect to the grooving-rollers, so as to 75 insure that the finished blank shall be symmetrically formed, or, in other words, that the grooves and ribs shall be uniformly disposed around the central axis of the blank and equidistant from such central axis. The 80 said guide is movable on the frame between the blank-holder and the grooving-rollers in a direction lengthwise of the blank, so that it may be advanced to a point adjacent to the grooving-rollers when the blank is being 85 advanced toward and between the same and may be retracted with the blank after the rollers have acted on the blank. Such backward movement of the centering-guide with the blank is necessary by reason of the fact 90 that the guide is adapted to engage the original cylindric surface of the blank, and said blank cannot pass backwardly through the guide after the ribs have been formed thereon by the action of the rollers. Said guide, 95 as shown more clearly in Figs. 4 and 5, embraces a lower or base portion K' and an upper part or cap K^2 , which is hinged to the lower or base portion, being preferably connected thereto by means of a pivot-pin k , lo- 100 cated at one side of the guide. Said centering-guide is provided with four radially-arranged centering-guide bars $k' k' k^2 k^2$, the lower ones, $k' k'$, of which are inserted in recesses formed in the lower part or base K' of 105 the guides, and the upper ones, $k^2 k^2$, of which are inserted and secured in a block K^3 , fitted in a recess in the upper portion or cap K^2 of the guide. The lower part or base K^2 and the block K^3 are provided with opposing recesses 110 forming a central aperture into which the ends of the guide-bars $k' k'$ project and through which the blank passes as it approaches the grooving-rollers. Provision is made for locking the cap K^2 of the centering-guide against 115 the lower portion thereof, the same being herein shown as consisting of a latch k^3 , hinged to the lower part or base and having a hooked end engaging the adjacent extremity of the cap K^2 . The centering-guide bars 120 are shown as secured in place in the base and in the cap-block K^3 by means of set-screws or in any other suitable manner. Manifestly the centering-guide bars may be adapted for larger or smaller blanks by adjusting them 125 radially in the base K^2 and block K^3 , said bars being secured by set-screws in radial slots in said base and block to afford such adjustment.

The guide K is arranged to slide on the ma- 130 chine-frame, and for this purpose the lower part or base K^2 thereof is shown as provided

with lateral flanges $k^4 k^4$, which engage the guide-grooves $e' e'$ in the top plate of the frame in which the carriage I also slides. In order to give an extended longitudinal bearing of the centering-guide on the frame of the machine, the carriage I is undercut at its forward end, and the base K' of the guide is extended lengthwise of the machine a considerable distance beneath the undercut end of the carriage, so that the extremity of the carriage carrying the work-holder J projects over or overhangs the rearward-extending parts of the base of said guide when the guide is adjacent to the blank-holder. For the purpose of giving motion to the centering-guide on the machine-frame a rock-shaft L is mounted transversely in the machine-frame beneath the said centering-guide, and said rock-shaft is provided with an upwardly-extending arm L' , the upper end of which engages a depending lug K^4 on the said guide. Provision is made for actuating said shaft L, consisting of a horizontally-arranged arm l , connected by means of a link l' with a foot-lever L^2 , which, as is shown in Fig. 1, is mounted on the side face of the frame. A weight L^3 is attached to an arm l^2 on the said shaft L and is so arranged that its gravity tends to throw the arm L' rearwardly, and thereby maintain the guide K normally at the rearward or backward limit of its movement. In the operation of these parts the foot-lever L^2 is depressed and the guide K thrown forward to a point adjacent to the grooving-rollers preparatory to the advance movement of the blank toward said grooving-rollers. To facilitate the introduction of the blank into the machine, the upper part or cap of the guide will be opened at the time the blank is inserted into the holder and clamped therein, the guide being at this time held in place adjacent to the grooving-rollers and in position to engage the outer or free end of the blank by keeping the foot pressed on the foot-lever L^2 . As said carriage I advances and forces the blank forward between the grooving-rollers, the advanced or end portion of the blank will be held rigidly in central position with respect to the grooving-rolls so long as the forward movement of the blank continues. When the grooves have been formed and the blank begins its backward movement, the foot-lever L^2 will be released, and the guide will then move backward with the blank as the carriage I is retracted. This movement is obviously necessary, for the reason that after the blank has been subjected to the action of the grooving-rollers the raised ribs or lands thereon will no longer pass through the centering-guide. After the blank has been retracted the cap will then be opened and the blank removed from within the same and from the holder J.

65 The construction described in the supporting devices for the grooving-rollers (shown

more clearly in Figs. 7 and 8) manifestly provides for radial adjustment of said grooving-rollers in accordance with the size of the blank employed. Said adjustment is manifestly effected through the turning of the adjusting-screws $b b$, which act on the outer ends of the roller-carrying bars $B' B'$, and which when adjusted serve to thrust said bars inward or permit their outward movement, as required for proper adjustment of the same.

An important advantage gained by the use of the machine described, embracing grooving-rollers for forming longitudinal grooves, as hereinbefore set forth, is that the action of said rollers, as the blank is forced or thrust between them, is to shift or move the metal of the blank to some extent endwise or toward the inner part or base of the grooved portion of the blank. This affords an important practical advantage in the construction of the blank, for the reason that the finished screw-tap is tapered either at its outer end only or throughout the length of the grooved portion thereof and is smaller at its outer end or extremity than at the inner end of said grooves. The rollers acting as described therefore operate to give an additional quantity of metal at the inner end of the grooved part of the blank, where the same is required, thereby producing a blank which is better adapted for the forming of a finished tap than in cases where the blank is formed by the action of radially or laterally operating dies, such as have heretofore been used for the purpose of making longitudinal grooves in such blanks.

So far as the general result sought to be obtained by the machine is concerned it is obvious that the same effect will be produced if the blank be immovable and the grooving-rollers movable as is obtained by the construction illustrated, and it follows that in its broader aspect my invention includes a construction embracing a blank-holder and a plurality of grooving-rollers, wherein either the blank-holder or the rollers, or both, are movable in a direction longitudinally of the blank in a manner to produce the proper or desired action of the grooving-rollers upon the blank.

I claim as my invention—

1. A machine for grooving tap-blanks comprising two main operative elements, namely, a roller-holder carrying a plurality of freely-rotative grooving-rollers and a blank-holder, said elements having reciprocating movement one with respect to the other in a direction endwise of the blank, whereby the blank may be forced endwise between said grooving-rollers and withdrawn therefrom.

2. A machine for grooving tap-blanks comprising a roller-holder carrying a plurality of freely-rotative grooving-rollers arranged in radial planes and a blank-holder having reciprocal movement toward and from said grooving-rollers.

3. A machine for grooving tap-blanks comprising a plurality of freely-rotative grooving-rollers arranged in radial planes, a blank-holder which has reciprocatory movement toward and from said grooving-rollers in a direction endwise of the blank, and a movable centering-guide for the blank located between the holder and grooving-rollers and which is movable in a direction endwise of the blank.
4. A machine for grooving tap-blanks comprising two main operative elements, namely, a plurality of freely-rotative grooving-rollers and a blank-holder, said elements being movable one with respect to the other in a direction endwise of the blank, whereby the blank may be forced endwise between said grooving-rollers, and a movable centering-guide for the blank located between the holder and rollers and independently movable with respect to the movable element.
5. A machine for grooving tap-blanks comprising a main frame, a roller-holder mounted on said frame, radially-adjustable roller-supporting bars mounted in said holder, freely-rotative grooving-rolls mounted in said supporting-bars, a reciprocating carriage, and a blank-holder secured to said carriage.
6. A machine for grooving tap-blanks comprising a frame, a roller-holder mounted on said standard and carrying a plurality of grooving-rollers, a reciprocating carriage provided with transverse grooves, a blank-holder having interlocking engagement with the grooves of the carriage, and means for giving reciprocatory motion to said carriage.
7. A machine for grooving tap-blanks comprising a main frame, a plurality of freely-rotative grooving-rollers mounted thereon, a reciprocating carriage mounted to slide on the frame, a blank-holder attached to said carriage, and means for actuating the carriage comprising a rotative shaft provided with an eccentric and a yoke rigidly connected with the carriage and engaging opposite sides of the eccentric.
8. A machine for grooving tap-blanks comprising a machine-frame, a plurality of freely-rotative grooving-rollers, a blank-holder, a shaft provided with an eccentric, a carriage having sliding engagement with said frame and provided with a yoke adapted to engage the eccentric at opposite sides thereof and a supporting-roller on the frame adapted to engage said yoke.
9. A machine for grooving tap-blanks comprising a frame, a plurality of grooving-rollers mounted on said frame, a reciprocating carriage adapted to slide on the frame and provided with a blank-holder and a guide mounted to slide on the frame between the blank-holder and the roller-holder in a direction endwise of the blank.
10. A machine for grooving tap-blanks comprising a main frame, a plurality of grooving-rollers mounted thereon, a reciprocating blank-holder also mounted on the frame and a guide movable on the frame in a direction endwise of the blank, said guide comprising two parts which are separable from each other to permit the insertion and removal of the blank.
11. A machine for grooving tap-blanks comprising a machine-frame, a plurality of grooving-rollers arranged in radial planes and which are adjustable radially upon the machine-frame, and a blank-holder adapted to reciprocate on the frame toward and away from the grooving-rollers, said blank-holder being provided with clamping means for holding the blank.
12. A machine for grooving tap-blanks comprising a machine-frame, a plurality of grooving-rollers arranged in radial planes and which are adjustable radially upon the machine-frame, a blank-holder adapted to reciprocate on the frame toward and away from the grooving-rollers and provided with clamping means for holding a blank and a guide for the blank provided with radially-adjustable centering-guide bars adapted for contact at their inner ends with the blank, said guide being movable on the frame between the grooving-rollers and the blank-holder in a direction endwise of the blank.
13. A machine for grooving tap-blanks comprising a frame, a plurality of grooving-rollers mounted in radial planes upon the frame, a blank-holder movable on the frame, a guide for the blank movable on the machine-frame between the blank-holder and the grooving-rollers, and means for shifting said guide upon the frame toward and from the grooving-rollers.
14. A machine for the purpose stated comprising a frame, a plurality of grooving-rollers mounted in radial planes upon the frame, a blank-holder movable on the frame, a guide for the blank mounted on the machine-frame between the blank-holder and the grooving-rollers, and movable toward and from said grooving-rollers, and means for shifting said guide upon the frame, embracing a foot-lever and connections between said foot-lever and the said guide.
15. A machine for grooving tap-blanks comprising a machine-frame, a plurality of grooving-rollers arranged in radial planes on the machine-frame, a blank-holder movable on the machine-frame, a guide mounted on the machine-frame between the blank-holder and the grooving-rollers and movable toward and from said grooving-rollers, a rock-shaft in the machine-frame below the said guide, said rock-shaft being provided with a rigid arm engaging the said guide, and a foot-lever connected with and actuating said rock-shaft.
16. A machine for grooving tap-blanks comprising a machine-frame, a plurality of grooving-rollers arranged in radial planes mounted on the machine-frame, a reciprocating blank-holder a guide for the blank movable on the machine-frame between the blank-holder and

the grooving-rollers, a weight or equivalent means acting on the guide and tending to hold the same in its position remote from the grooving-rollers, and means for throwing the
5 said guide toward the said grooving-rollers against the action of said weight.

In testimony that I claim the foregoing as

my invention I affix my signature, in presence of two witnesses, this 14th day of June, A. D. 1901.

FREDERICK N. GARDNER.

Witnesses:

J. C. ROOD,

MILAN NORTHROP.