No. 617,723. Patented Jan. 17, 1899.

U., H. E. & F. L. EBERHARDT.

GEAR CUTTER CLAMP FOR WHEEL BLANKS.

(Application filed Mar. 30, 1898.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

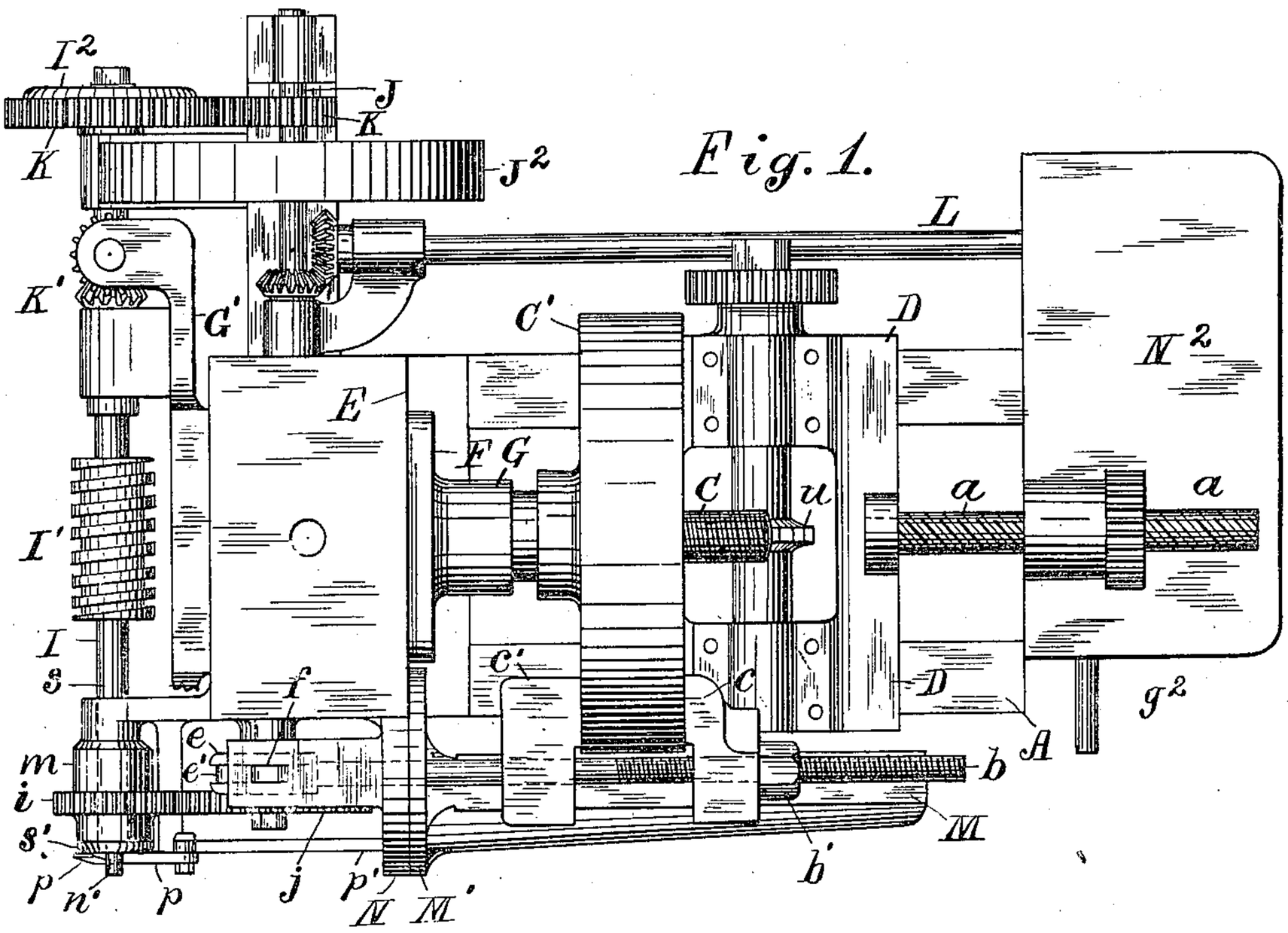
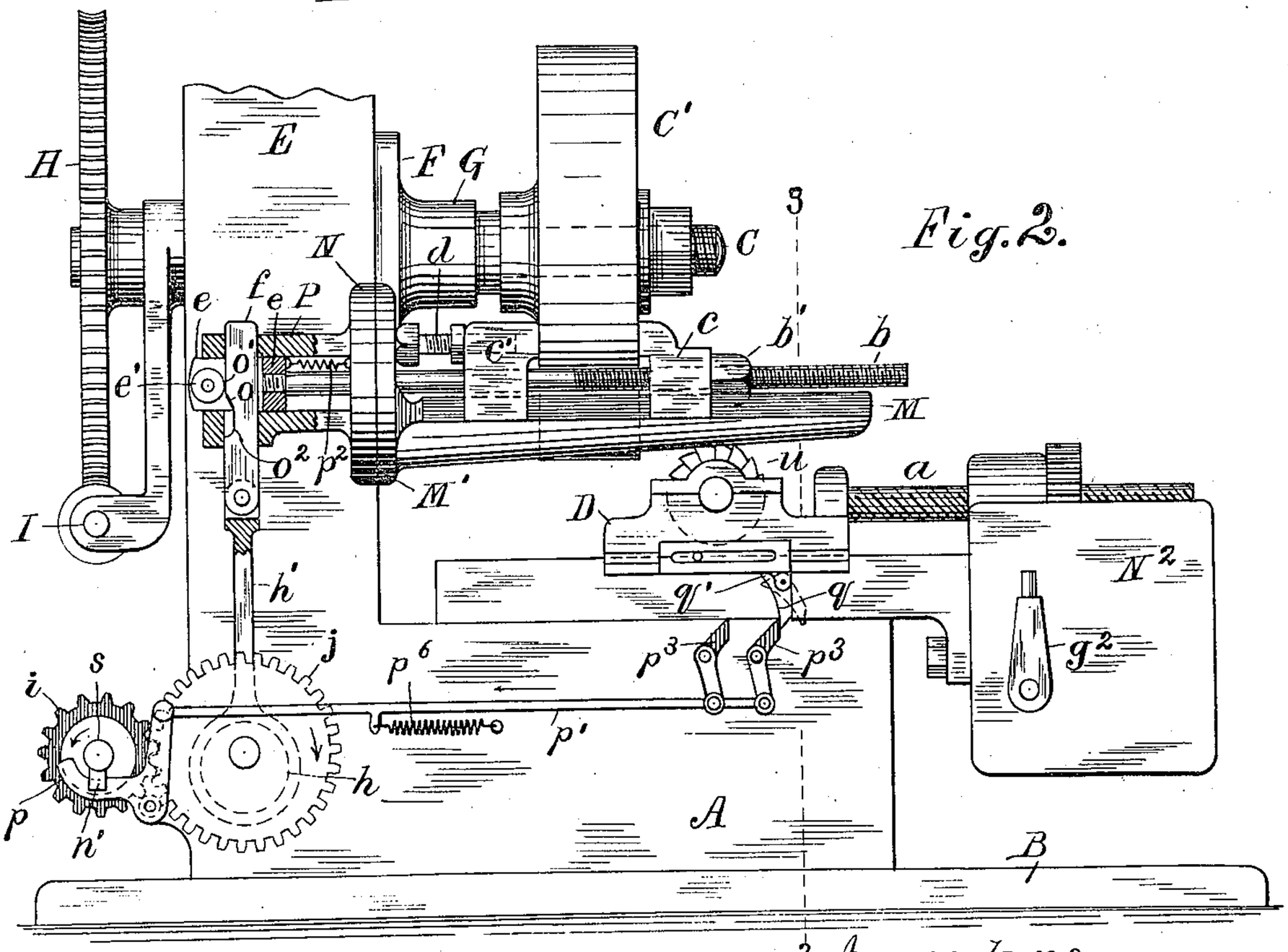


Fig. 2.



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(No Model.) 3 Sheets—Sheet 2.

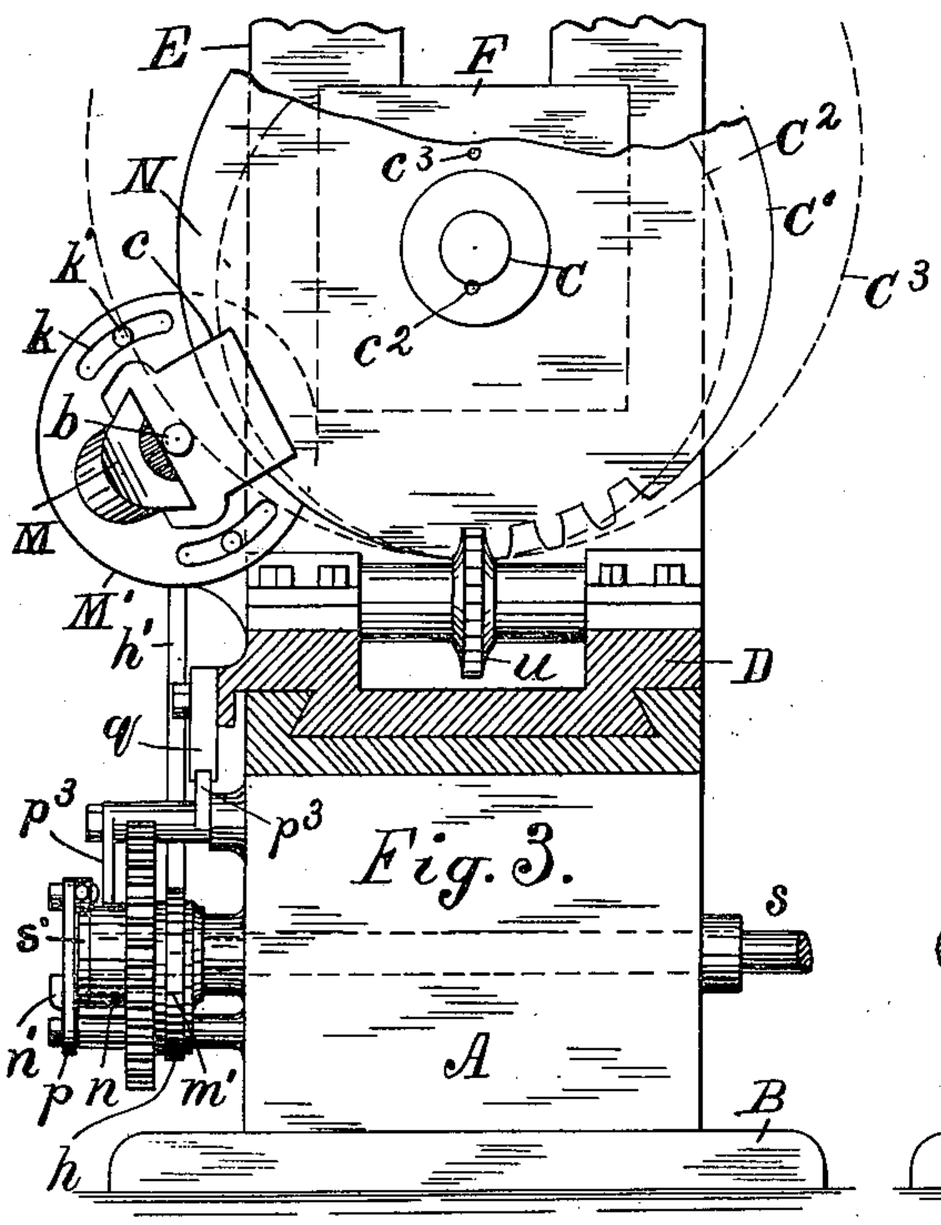

Fig. 3.

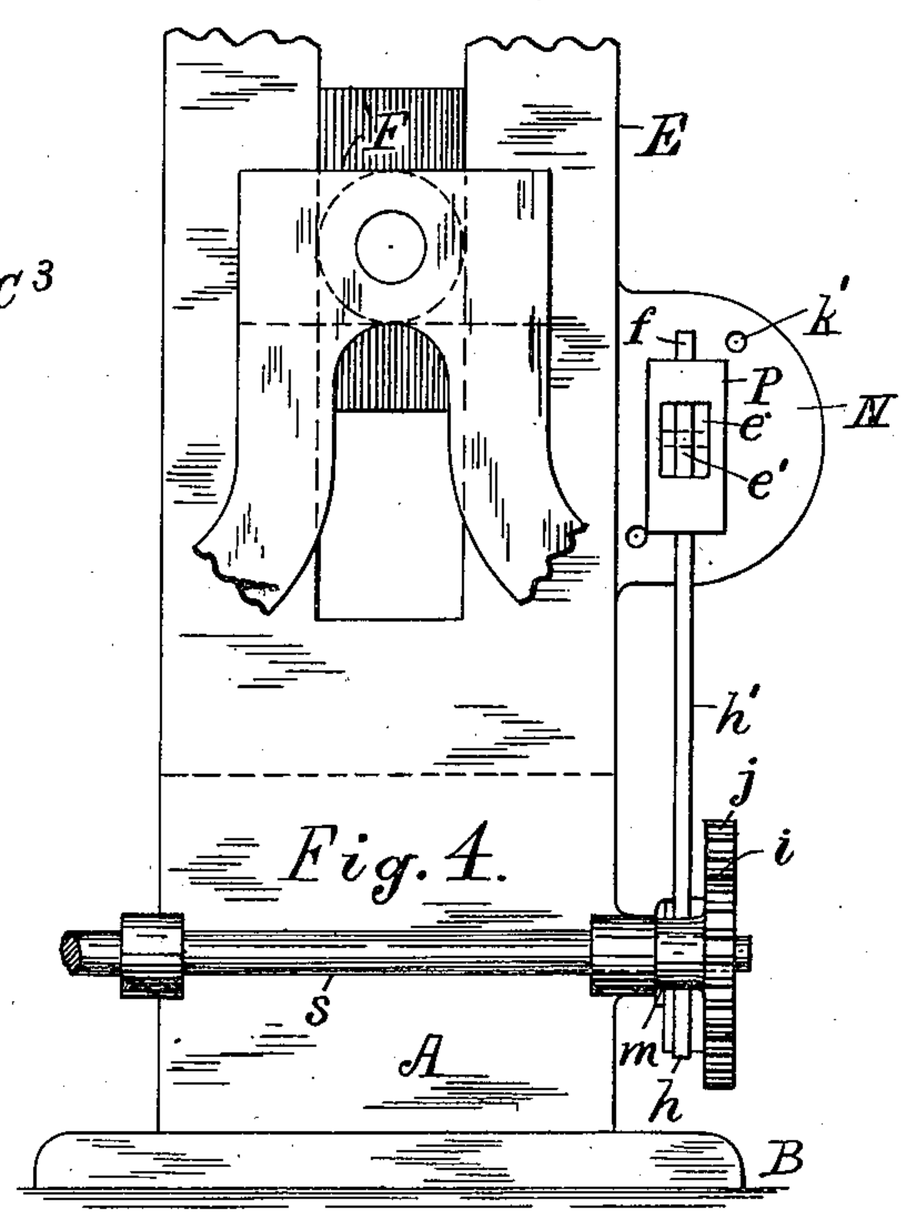

Fig. 4.

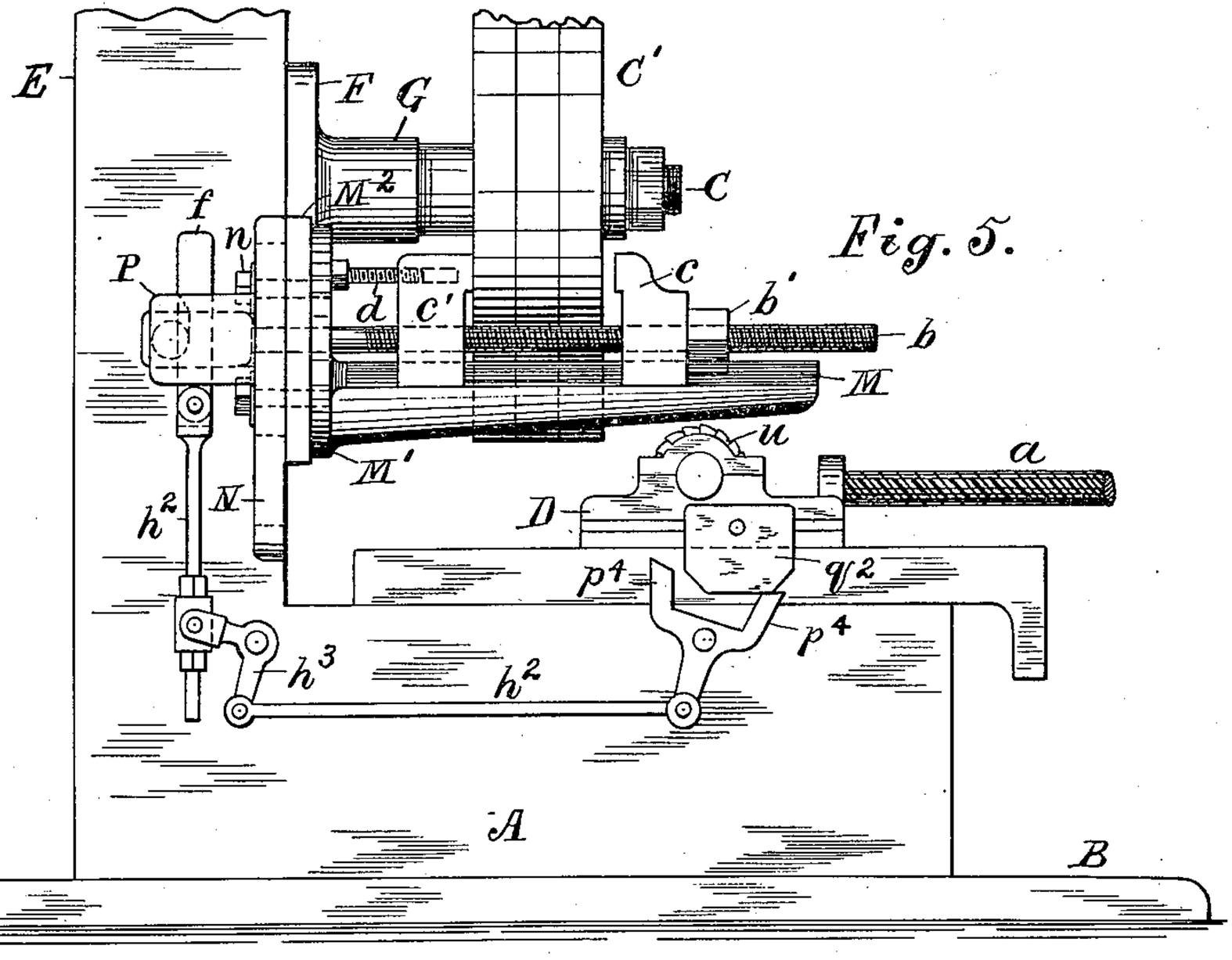

Fig. 5.

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GEAR CUTTER CLAMP FOR WHEEL BLANKS.

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(No Model.) 3 Sheets—Sheet 3.

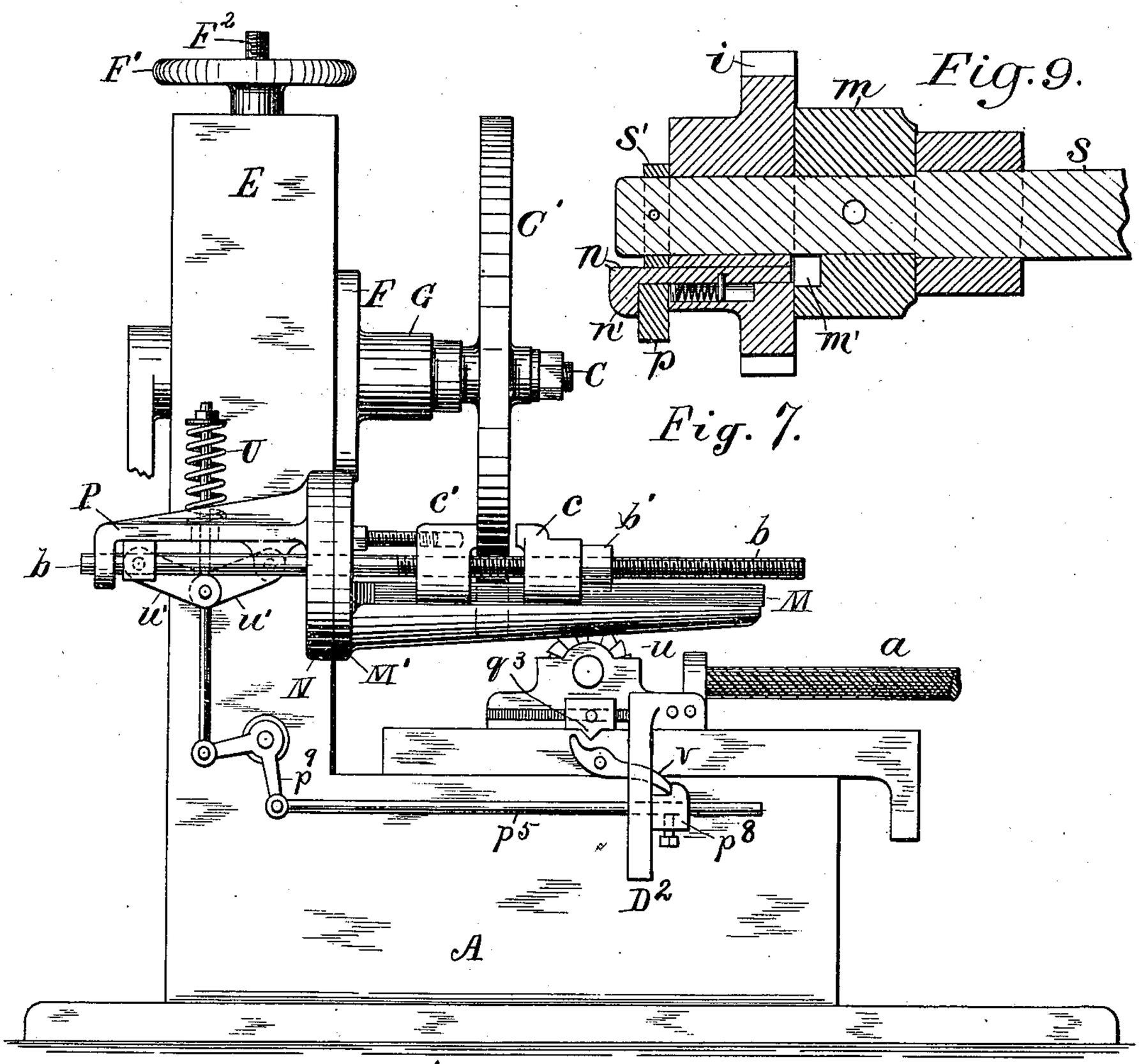

Fig. 7.

Fig. 9.

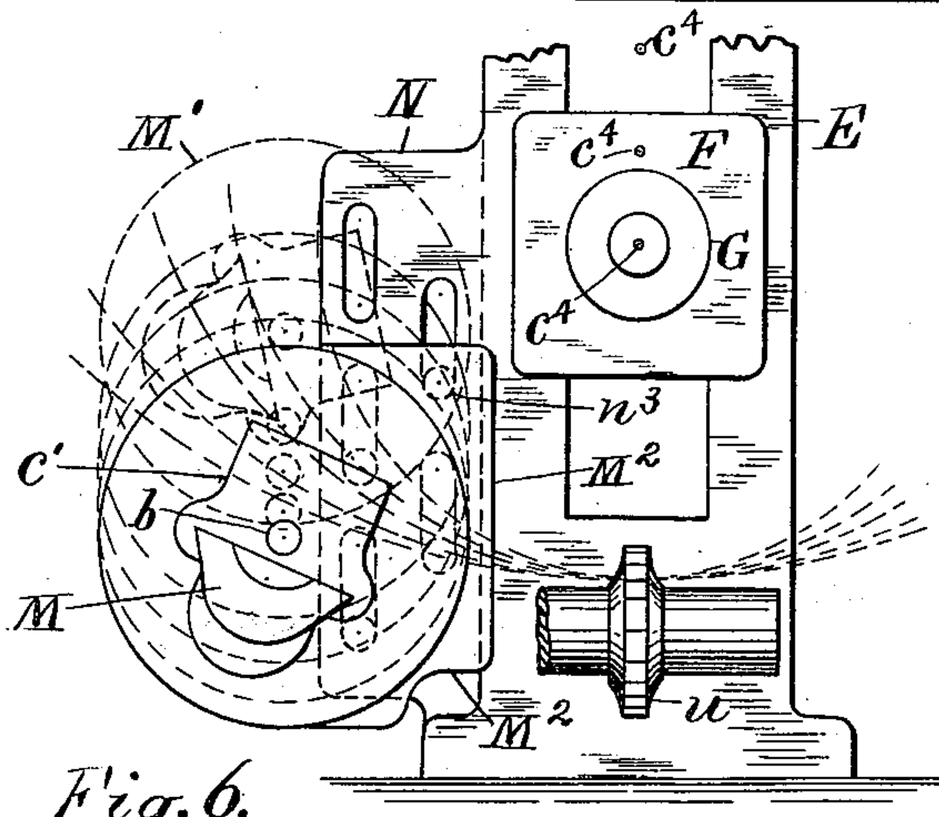

Fig. 6.

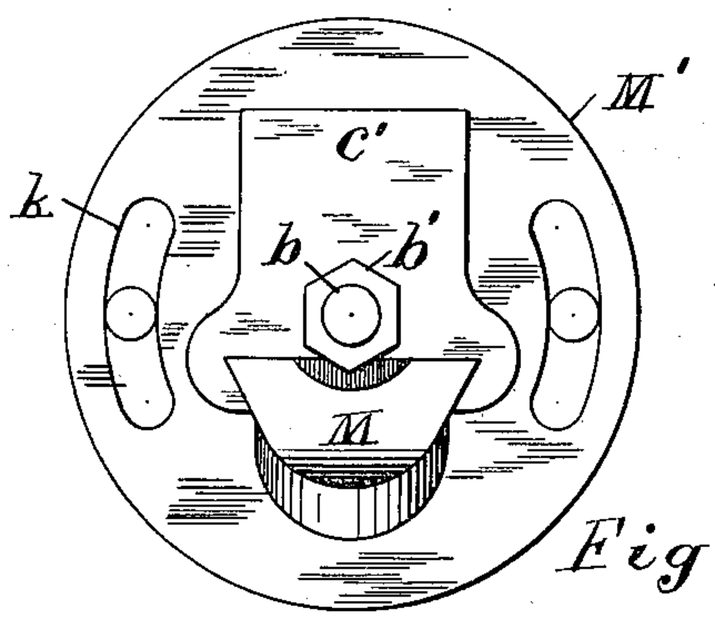

Fig 8.

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UNITED STATES PATENT OFFICE.

ULRICH EBERHARDT, HENRY E. EBERHARDT, AND FRED L. EBERHARDT,
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GEAR-CUTTER CLAMP FOR WHEEL-BLANKS.

SPECIFICATION forming part of Letters Patent No. 617,723, dated January 17, 1899.

Application filed March 30, 1898. Serial No. 675,657. (No model.)

To all whom it may concern:

Be it known that we, ULRICH EBERHARDT, HENRY E. EBERHARDT, and FRED L. EBERHARDT, citizens of the United States, residing at Newark, county of Essex, State of New Jersey, have invented certain new and useful Improvements in Gear-Cutter Clamps for Wheel-Blanks, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The object of the present invention is to furnish a means of holding the blank more firmly during the operation of cutting the teeth therein.

The invention consists of jaws adapted to clamp the rim of the blank during the cutting operation adjacent to the cutting-point and to automatically release the same during the shifting of the blank for cutting the succeeding teeth.

In automatic gear-cutting machines it is common to fix the circular blank upon a mandrel, which determines the position of the blank during the cutting of each tooth, the cutter being first fed through the blank and then retracted while the blank is shifted to its succeeding position, and all of these operations are repeated by automatic mechanism, so that when the blank and mechanism are properly adjusted the teeth may be cut in the entire wheel without further attention from the operator. Where the machine is employed to cut a very large blank or a blank is supported, owing to the small size of its bore, upon a mandrel which is incapable of holding it firmly, it is desirable to tightly clamp and hold the rim of the blank adjacent to the cutter to prevent the blank from springing or yielding during the cutting operation. Such yielding not only causes an inaccuracy in the shape of the teeth, but a roughness of their surface, owing to their vibration or chattering. In the present invention jaws are provided to automatically clamp the blank upon its front and rear sides at the proper time to hold the same rigidly during the cutting operation and automatically release the blank when necessary for shifting. The blank is thus securely held during the cutting operation and released during the shifting operation without any attention on the part of the workman. Both of the clamping-jaws may be moved to release the blank; but in practice the jaw between the rear side of the blank and the frame or column of the machine may remain adjusted in contact with the blank and only the front jaw be reciprocated. Wheels of small diameter require no such support during the cutting of the teeth, and the rims of wheels of large diameter vary very slightly in their position adjacent to the edge of the cutter, and clamping-jaws arranged to embrace a large wheel may therefore without material alteration in position be made to embrace others of smaller diameter. The mechanism for reciprocating the movable jaw is arranged to lock the same immovably when in contact with the blank, and such jaw-reciprocating mechanism is preferably actuated or controlled by the movements of the cutter-head, as its operation is effected during the retraction of such cutter-head from the notch which the cutter forms in the blank.

In the annexed drawings the invention is shown applied to a gear-cutting machine of the type represented in United States Patent No. 575,393, granted January 19, 1897, and several varieties of mechanism are shown for actuating the clamp in such cutter-head; but it should be understood that the clamps and their mechanism may be modified in form to adapt them to other gear-cutting machines.

In the drawings, Figure 1 is a plan of a gear-cutter such as is shown in the said patent, provided with a wedge-slide and rotary eccentric to actuate the clamping-jaw, with a part of the apparatus omitted, for feeding the cutter-head and intermittingly rotating the blank, as such devices are old and form no part of the present invention. Fig. 2 is a side elevation; Fig. 3, a front elevation with section of cutter-head D on line 3 3 in Fig. 2, and Fig. 4 a rear elevation showing such parts of the machine as are necessary to illustrate the form of invention shown in Fig. 1. In these figures the top of the column and part of the blank are broken off for want of room and the guide-arm at the rear end of the clamp-rod in Fig. 2, as well as the bed for the cutter-head in Fig. 3, are shown is section where

hatched. Fig. 5 is an elevation similar to Fig. 2 with a wedge-slide and an oscillating frog to actuate the clamping-jaw and the jaw-carrier adjustable vertically upon the column. Fig. 6 is a front elevation of the column and jaw-carrier with dotted lines showing the adjustment required for different blanks. Fig. 7 is a side elevation of a gear-cutter with alternative toggle mechanism for actuating the clamping-jaw, and Fig. 8 is an end elevation of the carrier and clamping-jaws upon a larger scale than the other figures. Fig. 9 is a vertical longitudinal section of the clutch shown upon the shaft *s* in Figs. 1 and 2 for automatically actuating the clamping-jaws.

Using the letters employed in the said prior patent, A designates the bed of the machine supporting the cutter-head D to move horizontally and having at one end the column E, upon which the mandrel-bearing F is adjustable vertically and fitted with sleeve G to carry the mandrel. The worm I′ and worm-wheel H (shown in Figs. 1 and 2) operate with suitable mechanism to rotate the blank at intervals. The cutter-head is shown (as in Patent No. 575,393) provided with a feed-screw *a*, which is actuated by well-known devices to reciprocate the cutter-head and drive the cutter to and fro through the rim of the blank. A driving-shaft J is shown, with driving-pulley J^2, connected by shaft L with the means for reversing the feed of the cutter-head. A shifter-arm g^2 is shown in Figs. 1 and 2 pivoted upon a casing N^2 like that shown in the said patent, which in practice contains the mechanism for rotating the feed-screw. The driving-shaft is shown connected with gears K and K′ and friction-clutch I^2, which turns the worm-wheel H and sleeve G. The remaining letters in the present drawings are different from those in the said patent, the mandrel which supports the blank being designated C and the blank itself C′.

A screw F^2 is shown in Fig. 7 provided with hand-wheel F′ to adjust the mandrel-bearing to and from the cutter.

Fig. 3 shows the relation of the clamping-jaw *c* to the cutter *u*, the cutter being shown at the bottom of the blank C′ and the clamping-jaw *c* applied to the rim of the blank at one side of the cutter.

The carrier M, having parallel edges with disk-like foot-plate M′, is mounted upon a bracket N at one side of the column E and is shown swiveled thereon, so as to turn the jaws toward the rim of the wheel whatever its curvature. The foot-plate is shown in Fig. 3, with slots *k* and bolts *k′* to secure it when adjusted. A jaw *c′* is shown at the rear side of the blank fitted movably to the carrier M and may be held in contact with the blank by any suitable means. In Fig. 2 a set-screw *d* is shown tapped into the jaw and projected therefrom against the foot-plate M′ and provided with a jam-nut to hold it when adjusted. The screw serves to adjust the jaw in contact with the blank, as the distance of the latter from the foot-plate may vary, and it also sustains the pressure upon the blank when clamped by the jaw *c*. The screw may be used without the jam-nut, as shown in Figs. 5 and 7, and is omitted from the jaw in Fig. 1, as any other suitable means may be used to hold the jaw from moving upon the carrier. The rear side of the bracket N is provided with a guide-arm P, and a clamping-rod *b* extends through the center of the foot-plate and through the jaws *c* and *c′* and projects past the guide-arm, which is constructed to support its outer end. In Fig. 2 the support is furnished by a head-piece *e*, which is attached to the rod and provided near its end with a roll *e′*. The head-piece is forked, as shown in Fig. 1, and a slide *f* is extended transversely through the guide-arm and through the slot in the head-piece and is provided adjacent to the roll *e′* with a wedge-surface *o*, which operates when the slide is suitably moved, as shown in Fig. 2, to draw the clamping-rod endwise and press the clamping-jaw *c* against the blank when the nut *b′* is suitably adjusted. When thus clamped, the side of the slide, which is furnished with a parallel seat *o′* adjacent to the wedge, serves to lock the jaw against the blank, and thus relieve the mechanism which reciprocates the slide from any strain during the cutting of the blank.

A spring p^2 presses the rod, with the roll, normally toward the slide, and when the movement of the slide is reversed the roll enters a notch c^2 at the base of the wedge and the clamp is released from the blank, as shown in Fig. 5.

The slide may be reciprocated by various means, but must be suitably moved to release the blank from the pressure of the jaw *c* during the shifting of the blank. Such shifting is commenced upon the retracting movement of the cutter-head as soon as the cutter is drawn clear from the space *g* in the blank, and the reciprocating mechanism for the slide may thus be actuated by the movement of the cutter-head at such time.

In Figs. 1 to 4 an eccentric *h* is shown connected to the slide by link *h′* and rotated by gears *i* and *j*, the gear *i* being fitted loosely upon its shaft *s*. The eccentric is shown in its lowest position, in which the clamping-jaw *c* is locked against the blank, and a half-revolution of the eccentric throws the slide upward and holds the jaw released. A subsequent semirevolution of the eccentric restores the slide to its initial position and clamps the jaw against the blank. These movements are effected by intermittent rotations of the pinion *i*, which is one-half the size of the wheel *j*.

The shaft *s* is continuously rotated by connection with the driving-pulley J^2 and is provided with a hub *m*, (see Fig. 1,) having a notch *m′* in its front side. The pinion *i* is held against the front of the hub by collar *s′*, (see Fig. 3,) and a sliding key *n* is inserted

through the pinion and in practice is pressed normally toward the notch m' by a suitable spring m^2. The key is formed with a head n', by which it may be drawn out of the notch, and a wedge-shaped latch p is pivoted adjacent to the collar s', so as to move to and from the shaft s. The latch is pressed normally against the shaft by spring p^6, (see Fig. 2,) and when held in the position shown in Fig. 2 the head of the key engages the point of the wedge and retracts the key from the revolving hub m and arrests the movement of the eccentric in either its upper or lower position.

The hub n may be secured to the shaft s in any convenient manner and is shown pinned thereto in Fig. 9, as well as the collar s', by which construction the pinion i is held in place movably upon the shaft, so that it may turn freely when the key n is withdrawn from the notch n'.

The latch is connected by rod p' with two trip-levers p^3, hinged adjacent to the cutter-head D. A dog q is pivoted adjustably to the cutter-head and constructed with foot q' to hold it rigidly as the cutter-head is retracted, so that it depresses the trip-levers, but swings clear of the same, as indicated by dotted lines, when the cutter-head advances to cut the blank. The dog is so adjusted upon the cutter-head that when the cutter first clears the blank in its retractive movement the dog trips the first lever and clutches the pinion to the shaft s, thus rotating the eccentric one-half a revolution and releasing the clamping-jaw c. The blank-shifting mechanism then operates to rotate the blank, which is effected before the retractive movement of the cutter-head brings the dog q in contact with the second trip-lever p^3, which then trips such lever and produces another semirotation of the eccentric to lock the jaw against the blank before the cutter-head advances to cut it. By this construction the cutter-head simply actuates the trip-levers, and the power to clamp and unclamp the jaw is furnished by the rotating shaft; but the movement of the cutter-head may be made to move the slide directly, as shown in Fig. 5. In this figure a double trip-lever or so-called "frog" having arms p^4 is oscillated by a dog q^2 upon the cutter-head. The frog is connected with the slide by rods h^2 and bell-crank h^3, and the cutter-head shifts the slide f into the required opposite positions while the cutter is withdrawn from the blank and when the cutter-head is moving backward and forward during the shifting of the blank. The jaw is thus unclamped and reclamped before the cutter begins the succeeding cut.

Fig. 7 also shows a construction in which the power to clamp the jaw is derived from the cutter-head, toggle-links u' being arranged to operate the rod b and actuated by a bell-crank p^9 and connections with the cutter-head. A lug D^2 is projected from the cutter-head, and a rod p^5 is extended from the bell-crank through such lug and provided with an adjustable collar p^8. A spring U is provided to normally straighten the toggle-links to clamp the jaw C, and the retractive movement of the cutter-head bends the links, as shown in Fig. 7, and thus unclamps the jaw, which is held in such position during the rotation of the blank by a latch v, which is pivoted upon the bed of the machine to engage a tooth upon the collar p^8. A dog q^3 is fixed upon the cutter-head to press the tail of the latch as the cutter is advanced to cut the blank, thus releasing the collar p^8 and permitting the spring U to reclamp the jaw.

In Figs. 1 to 4 the clamping device is shown mounted upon a bracket N, which is a fixture upon the column E, and the clamping-jaws thus occupy a fixed relation to the cutter u, although they may be tipped at various angles by the turning of the foot-plate M', which sustains the jaw-carrier. Blanks varying considerably in size may be clamped with such a construction, as the rims of the blanks do not vary widely in position relative to the cutter u. A blank C' is shown in full lines in Fig. 3, and a portion of two other blanks is indicated by the dotted curves C^2 and C^3, which blanks would be supported by shifting the mandrel to the positions designated by the centers c^2 and c^3. The curves of these blanks all intersect the clamping-jaws, and could thus be held by the clamp without changing its adjustment upon the column.

In Fig. 6 the bracket N is shown slotted, and the foot sustaining the carrier is mounted upon a plate M^2, which is vertically adjustable upon the bracket and clamped thereto by bolts n^3. Fig. 6 shows the various positions of the carrier-foot upon the bracket to bring the jaws into exactly the same relation to blanks of various sizes, the centers of the blanks and the requisite positions of the mandrels to carry such blanks being indicated by the small circles c^4. The foot-plate is represented in dotted lines in the different required positions, with a central circle showing the clamp-rod b, and the jaws are shown in the upper and lower positions turned toward the center of the blank to which they are applied.

The clamping-jaw c may be moved outwardly upon the carrier M to admit any number or thickness of blanks upon the mandrel, the nut b' serving to adjust the jaw tightly against the blank when the locking device is actuated. In like manner the screw d serves to set the adjustable jaw c' in contact with the rear side of the blanks whatever their distance from the column or mandrel support. With such construction it is only necessary to move one of the jaws to actuate the clamping device; but both of the jaws may be made movable, if preferred, and the form of the carrier and jaws varied to suit the requirements of different machines. As a va-

riety of means is shown herein for actuating the clamping-jaw during the retraction of the cutter from the blank, so that the blank may be shifted before the cutter is fed forward, it will be understood that the invention is not limited to the particular form described herein, but that the mechanism for thus actuating the jaws may be varied to suit the construction of different machines.

The essential part of the invention is the combination, with the clamping jaw or jaws, of means to press the jaw upon the blank during the cutting operation and means to release the jaw from the blank during the shifting of the latter.

In automatic gear-cutting machines the mechanism for shifting the blank is actuated when the cutter is withdrawn therefrom, and the clamping-jaw in the present invention is therefore connected with suitable means to release it from the blank before the shifting mechanism rotates the latter and to press it upon the blank as soon as the shifting mechanism has operated and before the cutter commences to form the succeeding tooth. As all these operations have a definite time relation to the retraction of the cutter-slide, it is common to actuate the blank-shifting mechanism by connection with the cutter-slide, and the cutter-slide is also utilized in the present invention to actuate the jaw-clamping device. These parts may, however, be actuated by any other part of the machine which operates synchronously with the retraction of the cutter-slide, as the parts of the feed-reversing mechanism and all of the shafts and gears connected therewith.

Having thus set forth the nature of the invention, what is claimed herein is—

1. In a gear-cutting machine, the combination, with a driving-shaft and means actuated thereby for intermittingly rotating the blank and feeding a cutter through the same, of mechanism for supporting the blank, clamping-jaws arranged upon opposite sides of the blank, and means actuated by such driving-shaft for automatically operating the jaws to clamp the blank during the cutting operation and to release the same during the shifting operation, substantially as herein set forth.

2. In a gear-cutting machine, the combination, with a driving-shaft and means actuated thereby for intermittingly rotating the blank and feeding a cutter through the same, of mechanism for supporting the blank, a clamping-jaw fixed at one side of the blank, a jaw held movably upon the opposite side of the blank, and means actuated by such driving-shaft for automatically pressing the movable jaw against the blank during the cutting operation, substantially as herein set forth.

3. In a gear-cutting machine, the combination, with a driving-shaft and means actuated thereby for intermittingly rotating the blank and feeding a cutter through the same, of mechanism for supporting the blank, a clamping-jaw fixed adjustably at one side of the blank, a jaw provided with means for reciprocating it to and from the other side of the blank, and means actuated by such driving-shaft for automatically pressing the movable jaw against the blank during the cutting operation, and retracting it therefrom during the shifting of the blank, substantially as herein set forth.

4. In a gear-cutting machine, the combination, with a driving-shaft and means actuated thereby for intermittingly rotating the blank and feeding a cutter through the same, of a suitable support with a mandrel-bearing mounted thereon and a mandrel to carry the blank, a jaw-carrier projected parallel with the mandrel, a movable jaw held adjustably thereon to fit against one side of the blank, a jaw provided with means for moving it to and from the opposite side of the blank, and means actuated by the driving-shaft for automatically pressing the movable jaw against the blank during the cutting operation, and retracting it therefrom during the shifting of the blank, substantially as herein set forth.

5. In a gear-cutting machine, the combination, with a driving-shaft and means actuated thereby for intermittingly rotating the blank and feeding a cutter through the same, of a suitable support with a mandrel-bearing mounted thereon and a mandrel to carry the blank, a jaw-carrier mounted rotatably at the side of the mandrel with jaws movable thereon and arranged to fit upon opposite sides of the blank, and means actuated by such driving-shaft for pressing them upon the opposite sides of the blank during the cutting operation, substantially as herein set forth.

6. In a gear-cutting machine having means for intermittingly rotating the blank and feeding a cutter through the same, the combination, with a suitable support, of a mandrel-bearing and mandrel to carry the blank, a jaw-carrier projected parallel with the mandrel and rotatably and vertically adjustable at the side of the same, a jaw fixed upon such carrier to bear upon one side of the blank, and a jaw with means for pressing it upon the opposite side of the blank during the cutting operation, substantially as herein set forth.

7. In a gear-cutting machine having means for intermittingly rotating the blank and feeding a cutter through the same, the combination, with a suitable support, of a mandrel-bearing and mandrel to carry the blank, a jaw-carrier having parallel sides projected parallel with the mandrel, jaws movable thereon, with a set-screw to adjust one of the jaws, and a clamp-rod with adjusting-nut, extended through the other jaw and provided with means to clamp it upon the blank, substantially as herein set forth.

8. In a gear-cutting machine having means for intermittingly rotating the blank and feeding a cutter through the same, the combination, with a suitable support, of a mandrel-bearing and mandrel to carry the blank, a jaw-carrier projected parallel with the man-

drel, a jaw fixed adjustably upon the carrier, a movable jaw with clamp-rod having roll attached thereto, and a wedge with means for moving the same in contact with the roll to clamp such jaw against the blank, substantially as herein set forth.

9. In a gear-cutting machine having means for intermittingly rotating the blank and feeding a cutter through the same, the combination, with a suitable support, of a mandrel-bearing and mandrel to carry the blank, a jaw-carrier projected parallel with the mandrel, a jaw fixed adjustably upon the carrier, a movable jaw with clamp-rod having roll attached thereto, a slide having a wedge-surface and contiguous parallel seat, to press the roll and hold the same with the movable jaw locked against the blank, substantially as herein set forth.

10. In a gear-cutting machine having means for intermittingly rotating the blank and feeding a cutter through the same, the combination, with a suitable support, of a mandrel-bearing and mandrel to carry the blank, a cutter-head to move the cutter through the blank, a jaw-carrier projected parallel with the mandrel, a jaw fixed at one side of the blank, a jaw movable to and from the opposite side of the blank, mechanism for reciprocating such movable jaw, and means connected with the cutter-head for actuating such reciprocating mechanism during the retraction of the cutter from the blank.

11. In a gear-cutting machine having means for intermittingly rotating the blank and feeding a cutter through the same, the combination, with a suitable support, of a mandrel-bearing and mandrel to carry the blank, a cutter-head to move the cutter through the blank, a jaw fixed at one side of the blank, a jaw movable to and from the opposite side of the blank, means for locking such movable jaw against the blank, and mechanism for unlocking and retracting the jaw during the shifting of the blank, substantially as herein set forth.

12. In a gear-cutting machine having means for intermittingly rotating the blank and feeding a cutter through the same, the combination, with a suitable support, of a mandrel-bearing and mandrel to carry the blank, a cutter-head to move the cutter through the blank, a jaw-carrier projected parallel with the mandrel, a jaw fixed at one side of the blank, a jaw movable to and from the opposite side of the blank, means for locking the movable jaw against the blank, mechanism for unlocking and retracting such jaw, and means connected with the cutter-head for actuating such retracting mechanism, substantially as herein set forth.

13. In a gear-cutting machine having means for intermittingly rotating the blank and feeding a cutter through the same, the combination, with a suitable support, of a mandrel-bearing and mandrel to carry the blank, a cutter-head to move the cutter through the blank, a jaw-carrier projected parallel with the mandrel, a jaw fixed at one side of the blank, a jaw movable to and from the opposite side of the blank, means for locking the movable jaw against the blank, mechanism for unlocking and retracting such jaw, and means connected with the cutter-head for actuating such mechanism first in one direction to retract such jaw during the shifting of the blank, and to then reverse such mechanism to press the jaw upon the blank before and during the cutting operation, substantially as herein set forth.

14. In a gear-cutting machine having a bed with cutter-head movable horizontally thereon, and column with mandrel-bearing adjustable vertically, and means for intermittingly rotating the blank and reciprocating the cutter-head, the combination, with the column, of the bracket N having the foot-plate swiveled thereon, with the carrier M projected parallel with the mandrel, the jaw *c'* held adjustably upon the carrier at one side of the blank, and the jaw *c* provided with the screw-rod *b*, and means for pressing it upon the opposite side of the blank, as and for the purpose set forth.

15. In a gear-cutting machine having a bed with cutter-head movable horizontally thereon, and column with mandrel-bearing adjustable vertically, and means for intermittingly rotating the blank and reciprocating the cutter-head, the combination, with the column, of the bracket N having the foot-plate swiveled thereon with clamp-rod *b* extended through the center of the same, a guide for the rear end of the rod with mechanism to reciprocate the same, the carrier M projected from the foot-plate parallel with the mandrel, with fixed and movable jaws thereon, and nut to adjust the movable jaw upon the clamp-rod, as and for the purpose set forth.

16. In a gear-cutting machine having a bed with cutter-head movable horizontally thereon, and column with mandrel-bearing adjustable vertically, and means for intermittingly rotating the blank and reciprocating the cutter-head, the combination, with the column, of the bracket N having the foot-plate M' swiveled thereon with clamp-rod *b* extended through the center of the same, a guide-arm extended from the bracket with support for the rear end of the rod, mechanism sustained by the guide-arm to reciprocate the rod, the carrier M projected from the foot-plate parallel with the mandrel, with fixed and movable jaws thereon, and nut to adjust the movable jaw upon the rod, as and for the purpose set forth.

17. In a gear-cutting machine having a bed with cutter-head movable horizontally thereon, and column with mandrel-bearing adjustable vertically, and means for intermittingly rotating the blank and reciprocating the cutter-head, the combination, with the column, of the bracket N having the foot-plate M' swiveled thereon with clamp-rod *b* extended

through the center of the same, a guide-arm P extended from the bracket with support for the rear end of the rod, a roll *e'* attached to the end of the rod, and a slide movable transversely to the guide-arm with wedge to press upon the roll, and clamp the movable jaw against the blank, as and for the purpose set forth.

18. In a gear-cutting machine, the combination, with the gear-cutter frame having a mandrel-bearing and a mandrel to carry the blank, of a shaft with means for intermittingly rotating the blank and actuating the cutter-feed, a cutter-head to carry the cutter and move it through the blank, jaws adapted to clamp the blank during the cutting operation, a rotary member, as an eccentric, to actuate the jaws, a clutch connecting the shaft with said rotary member, and a trip-lever with dog operated by the cutter-head to actuate the clutch during a half-rotation of such rotary member, substantially as herein shown and described.

19. In a gear-cutting machine, the combination, with the gear-cutter frame having a mandrel-bearing and mandrel to carry the blank, of a shaft with means for intermittingly rotating the blank and actuating the cutter-feed, a cutter-head to carry the cutter and move it through the blank, jaws adapted to clamp the blank during the cutting operation, a rotary member, as an eccentric, to actuate the jaws, a clutch connecting the shaft with said rotary member, a dog upon the cutter-head, a rod connected with the clutch mechanism and with two trip-levers arranged in the path of such dog, the dog and levers being arranged to actuate the clutch twice while the cutter is withdrawn from the blank, so as to unclamp and clamp the jaws before and after the shifting of the blank, substantially as herein set forth.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

ULRICH EBERHARDT.
HENRY E. EBERHARDT.
FRED L. EBERHARDT.

Witnesses:
THOMAS S. CRANE,
JOS. B. PIERSON.