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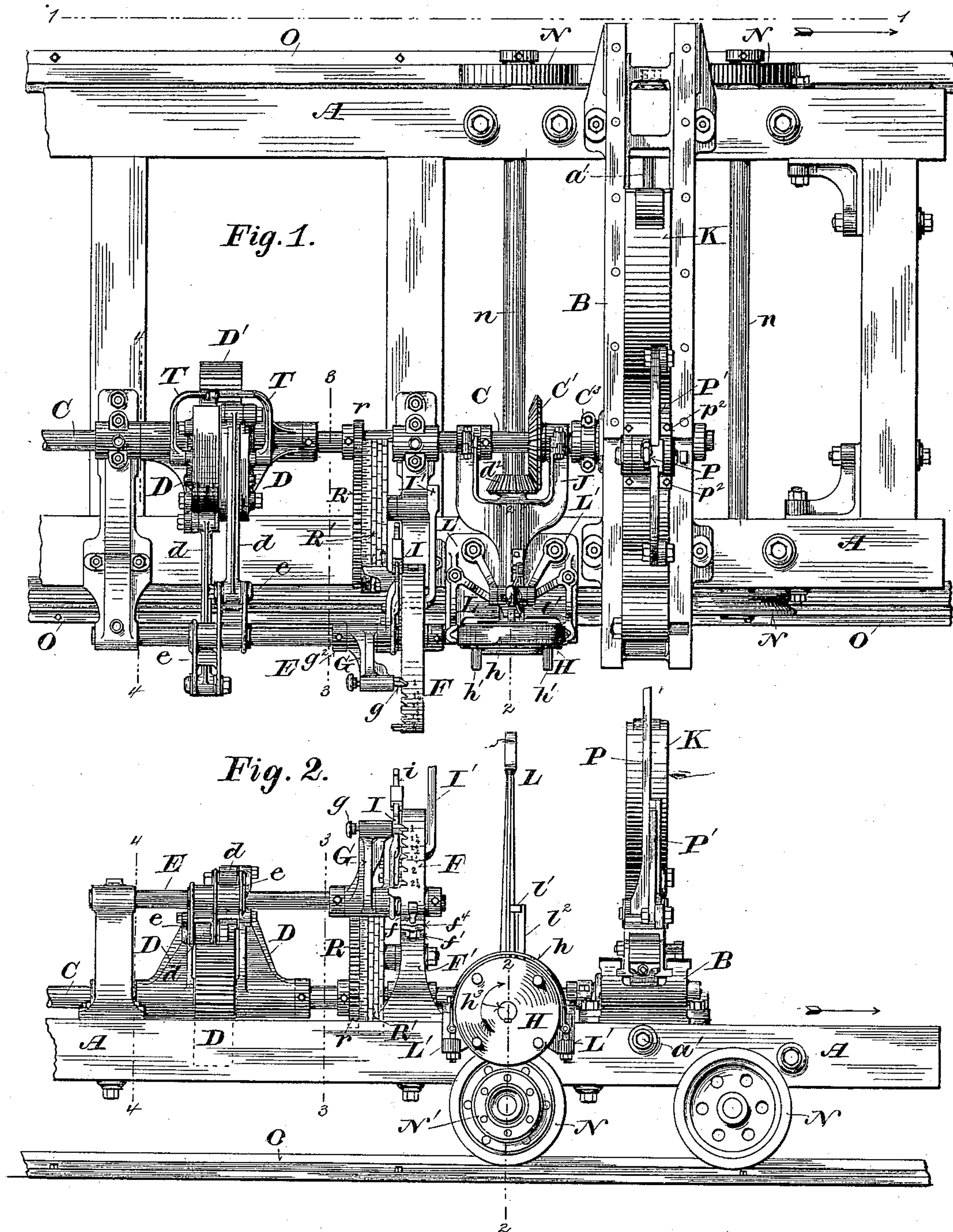
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A. CUNNINGHAM & E. J. MULLER.

SAW MILL SET WORKS.

No. 407,334.

Patented July 23, 1889.



WITNESSES:

Chas. L. Goss.
George M. Goll

INVENTORS,

Albert Cunningham
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BY

E. A. Bottom

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(No Model.)

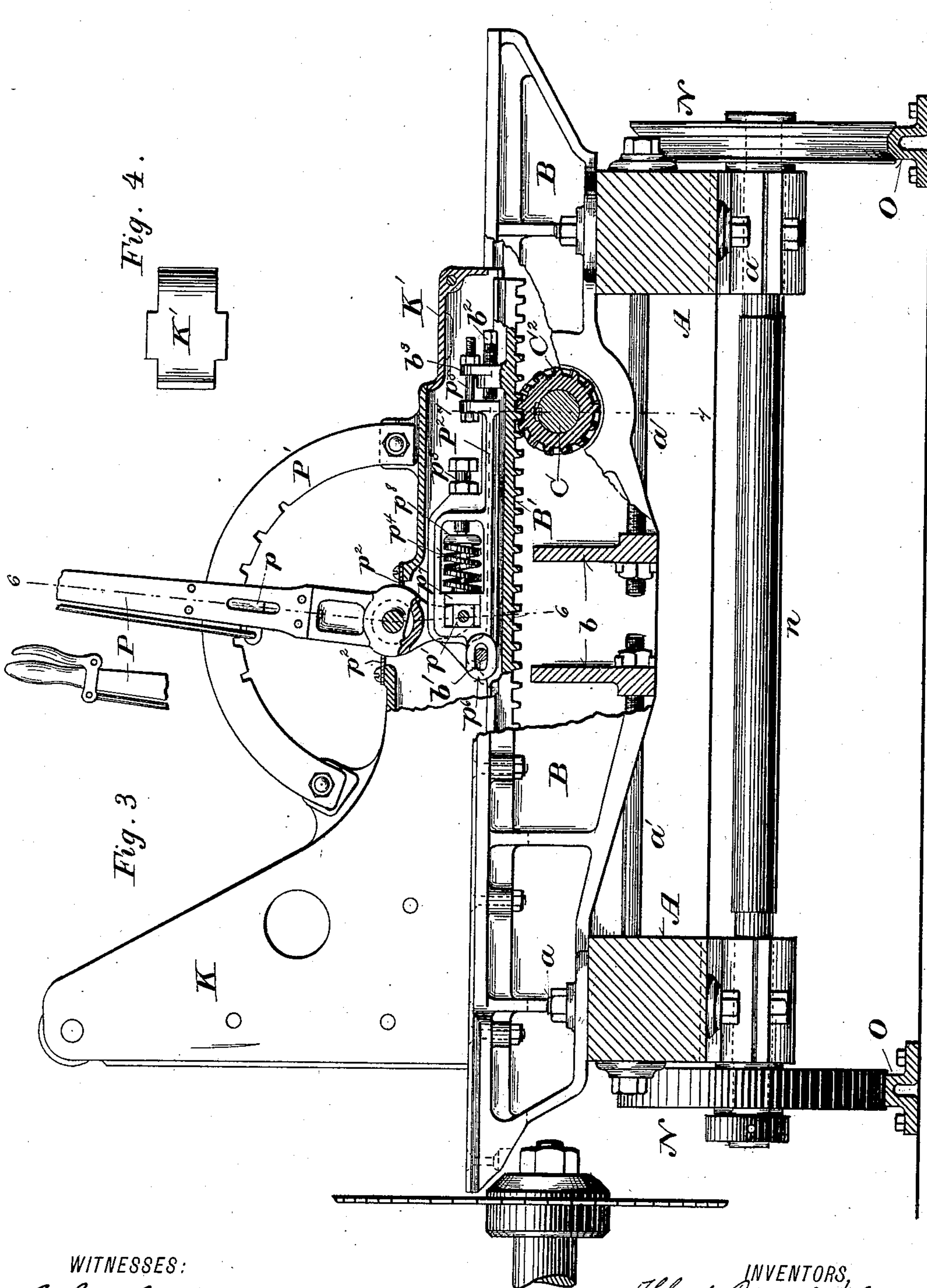
5 Sheets—Sheet 2.

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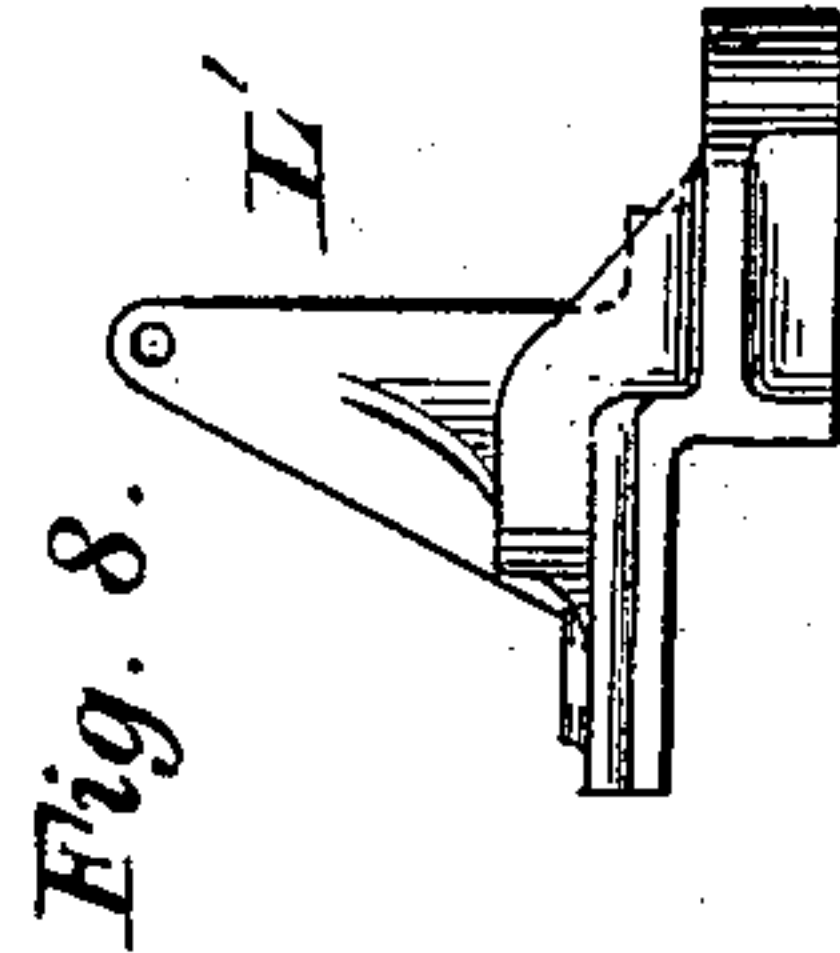
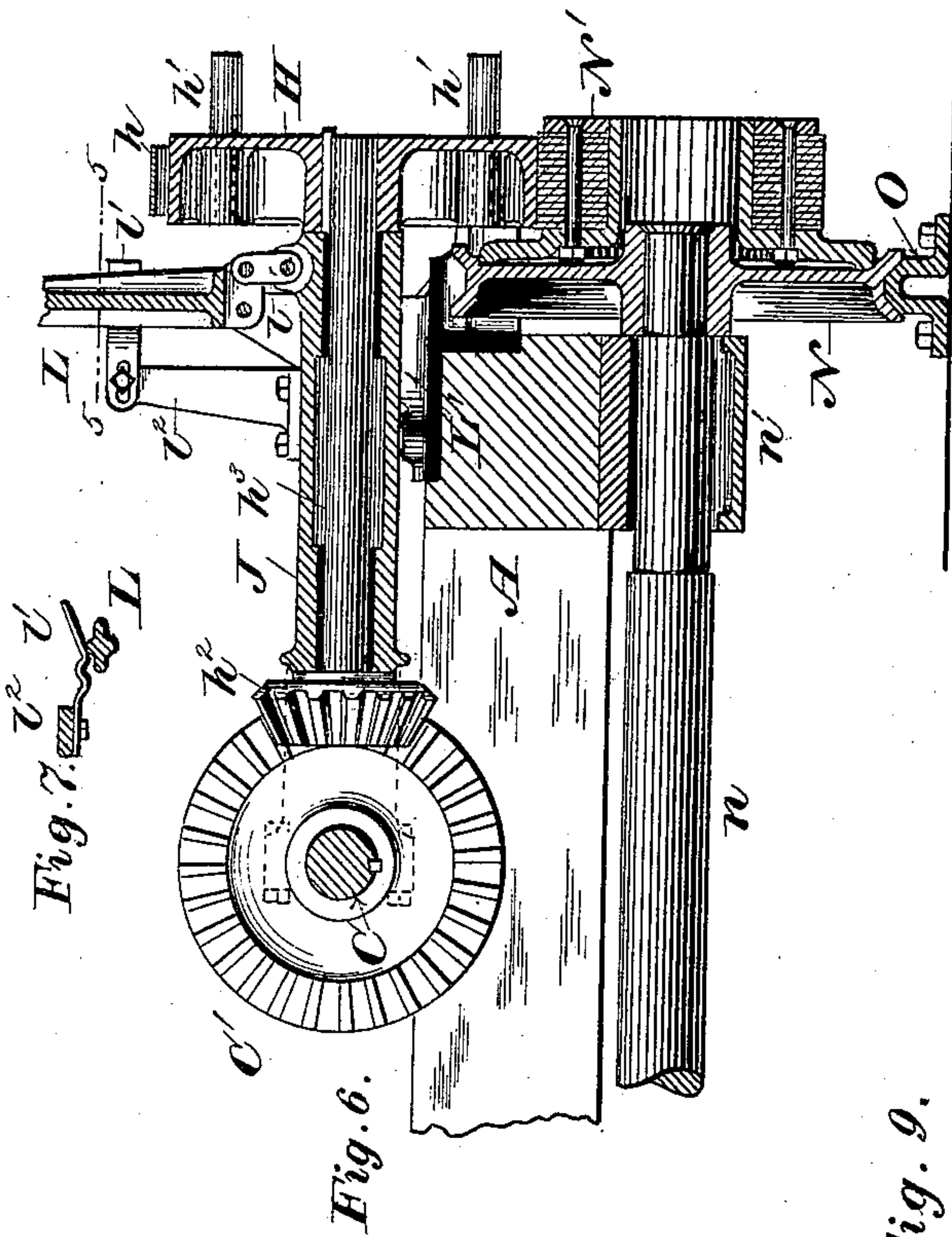


Fig. 9.

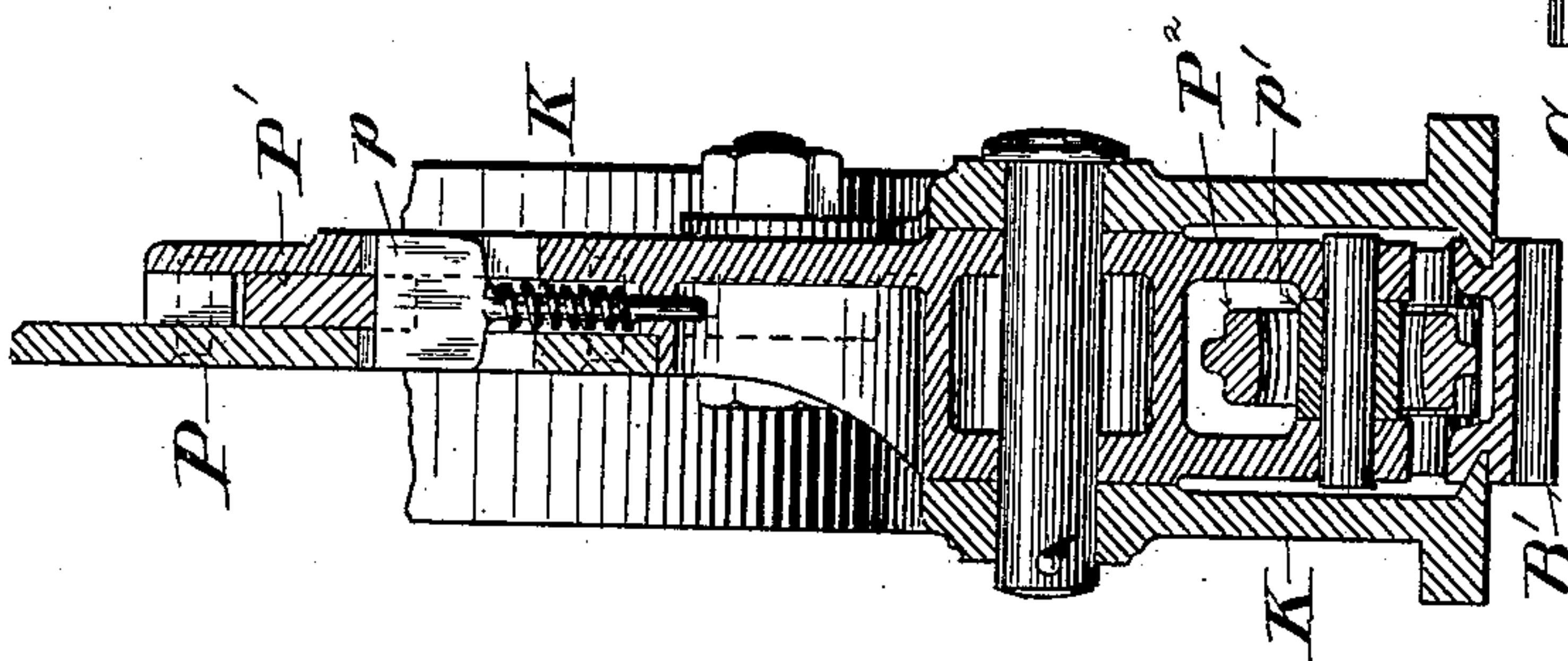
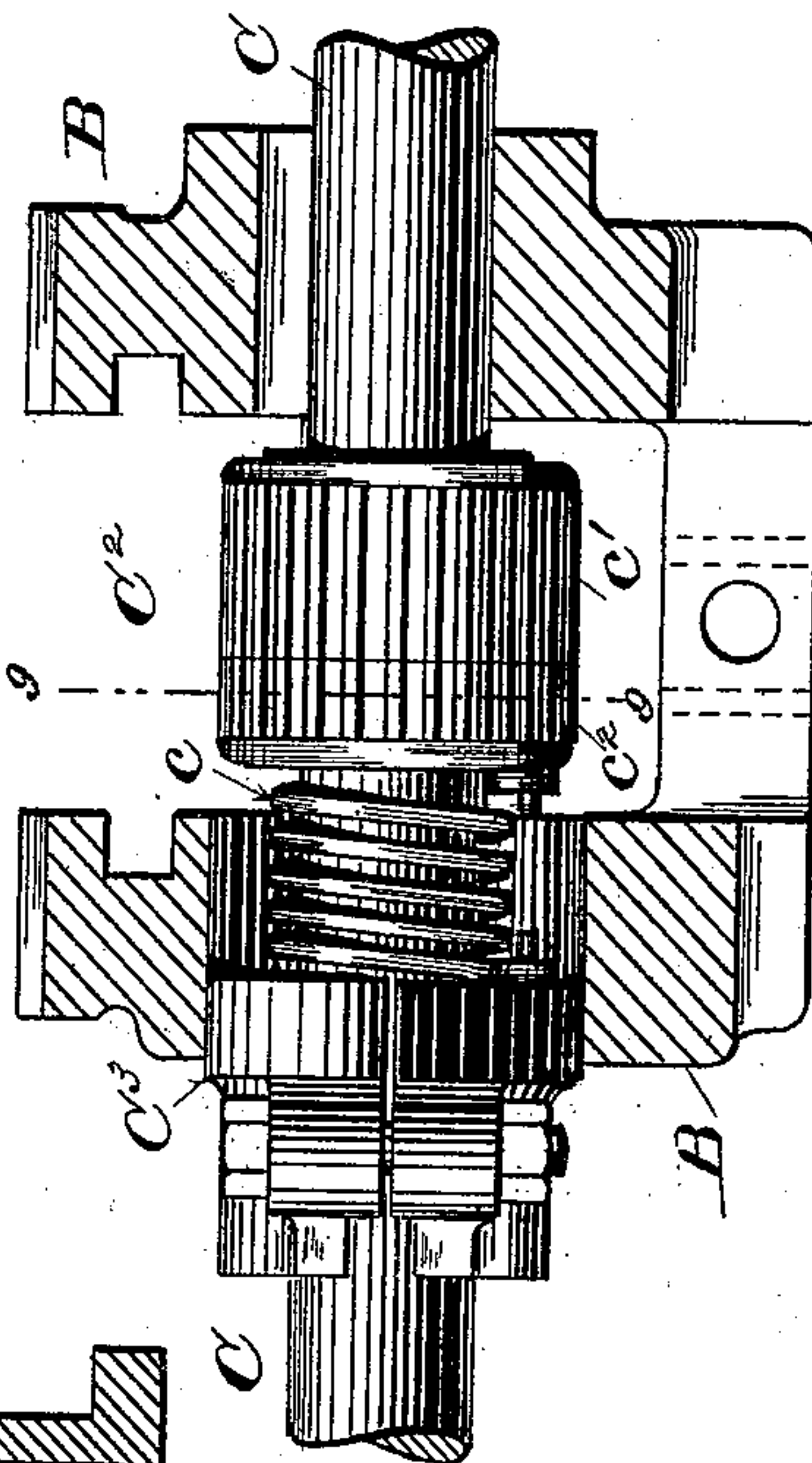


Fig. 5.

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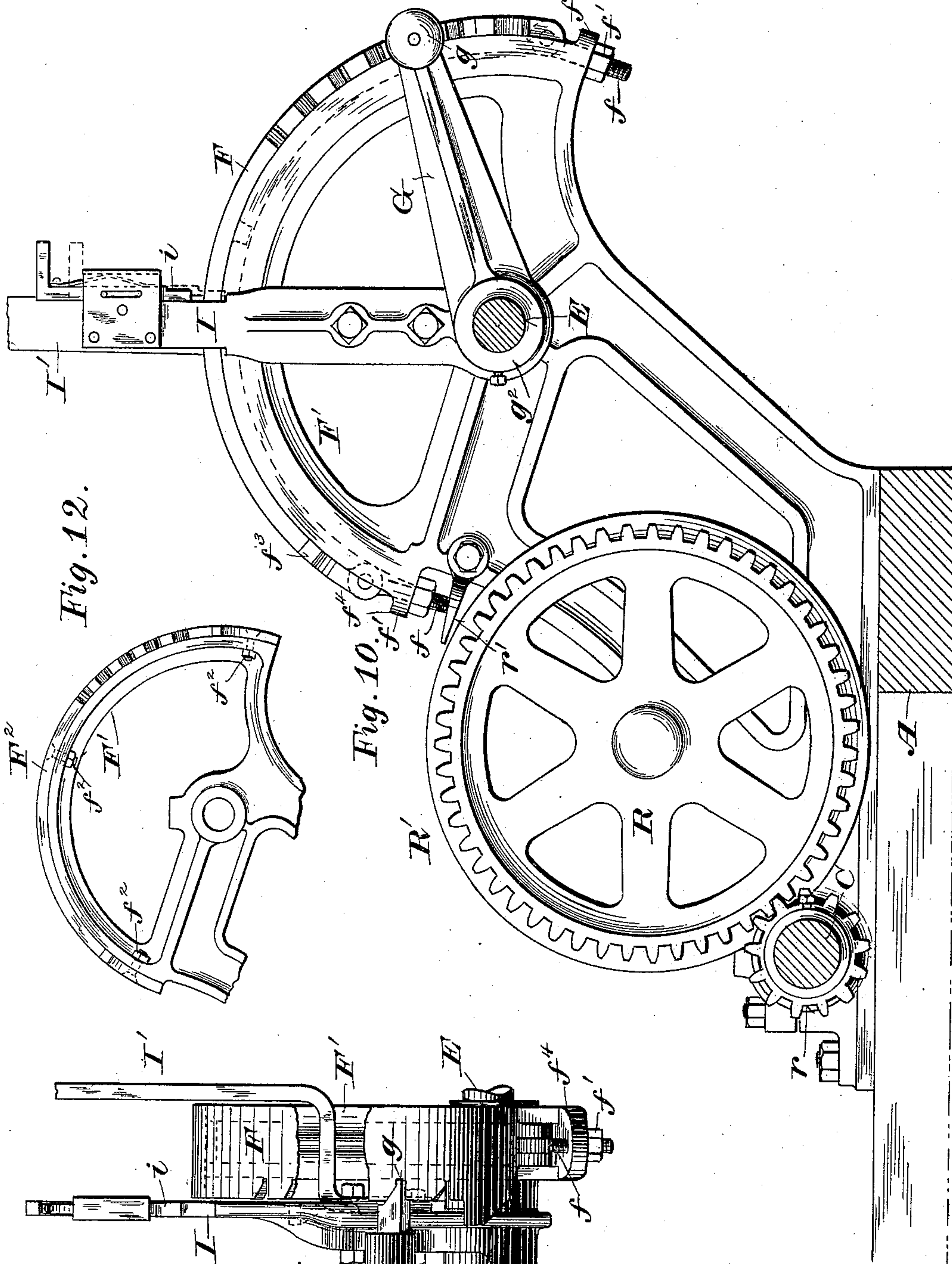
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Fig. 11.

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Fig. 15.

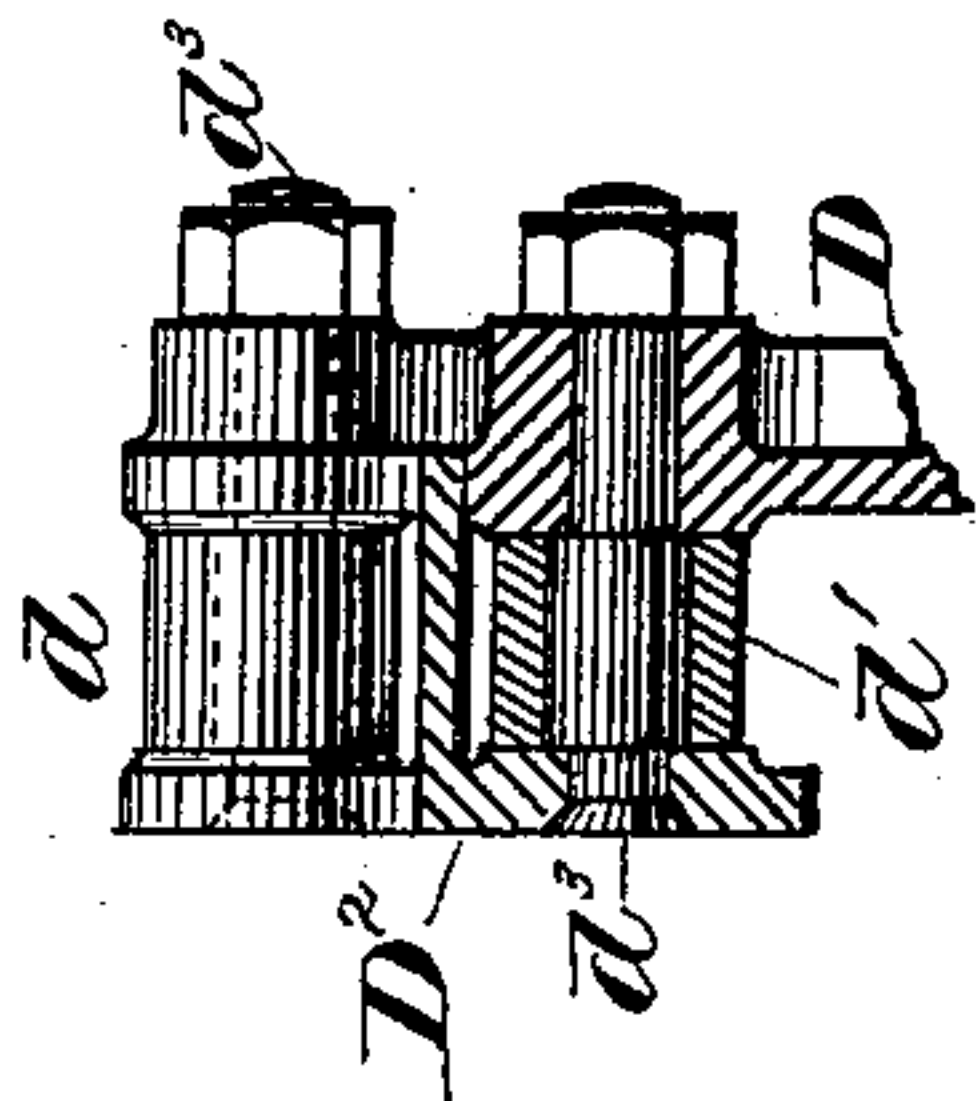


Fig. 14.

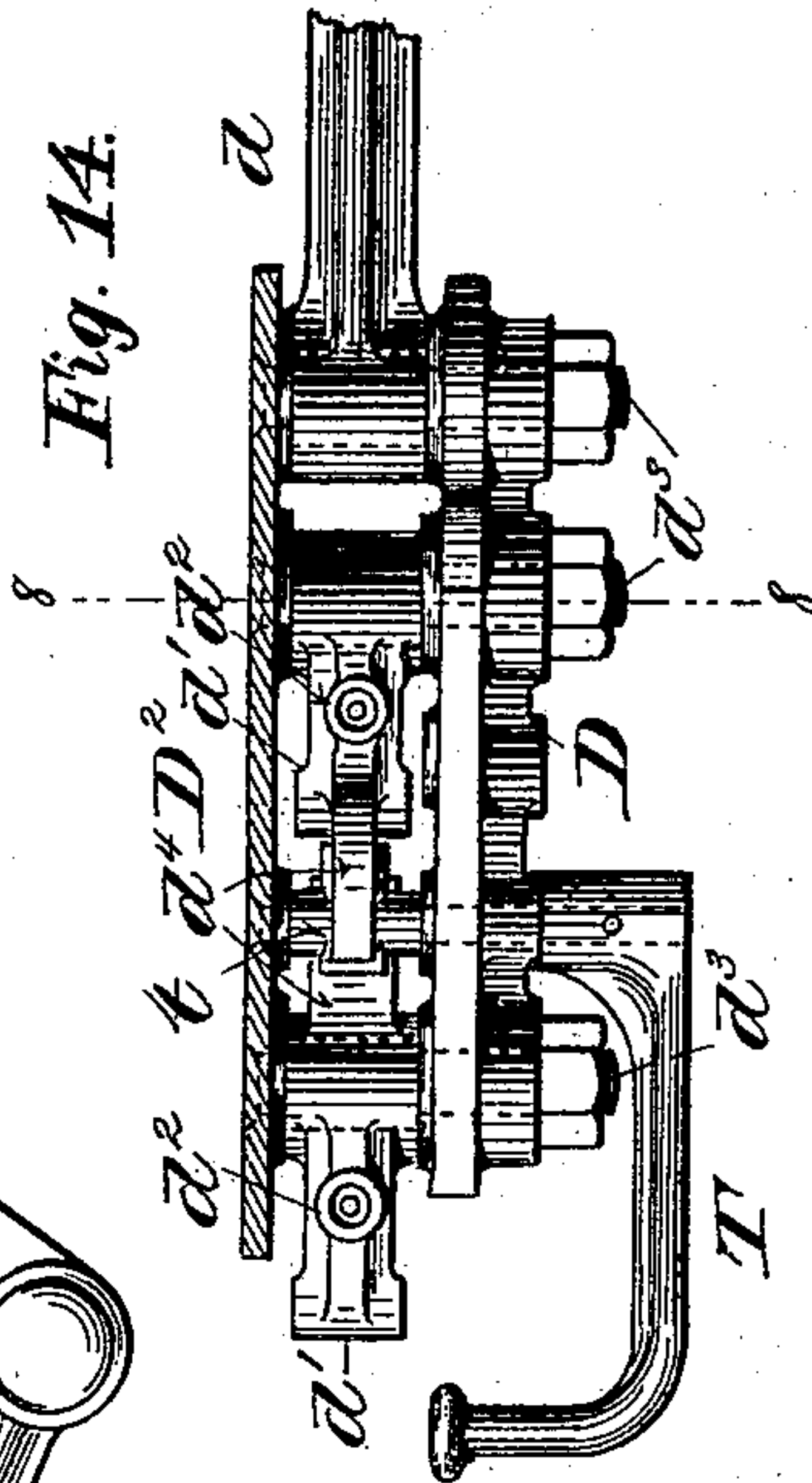
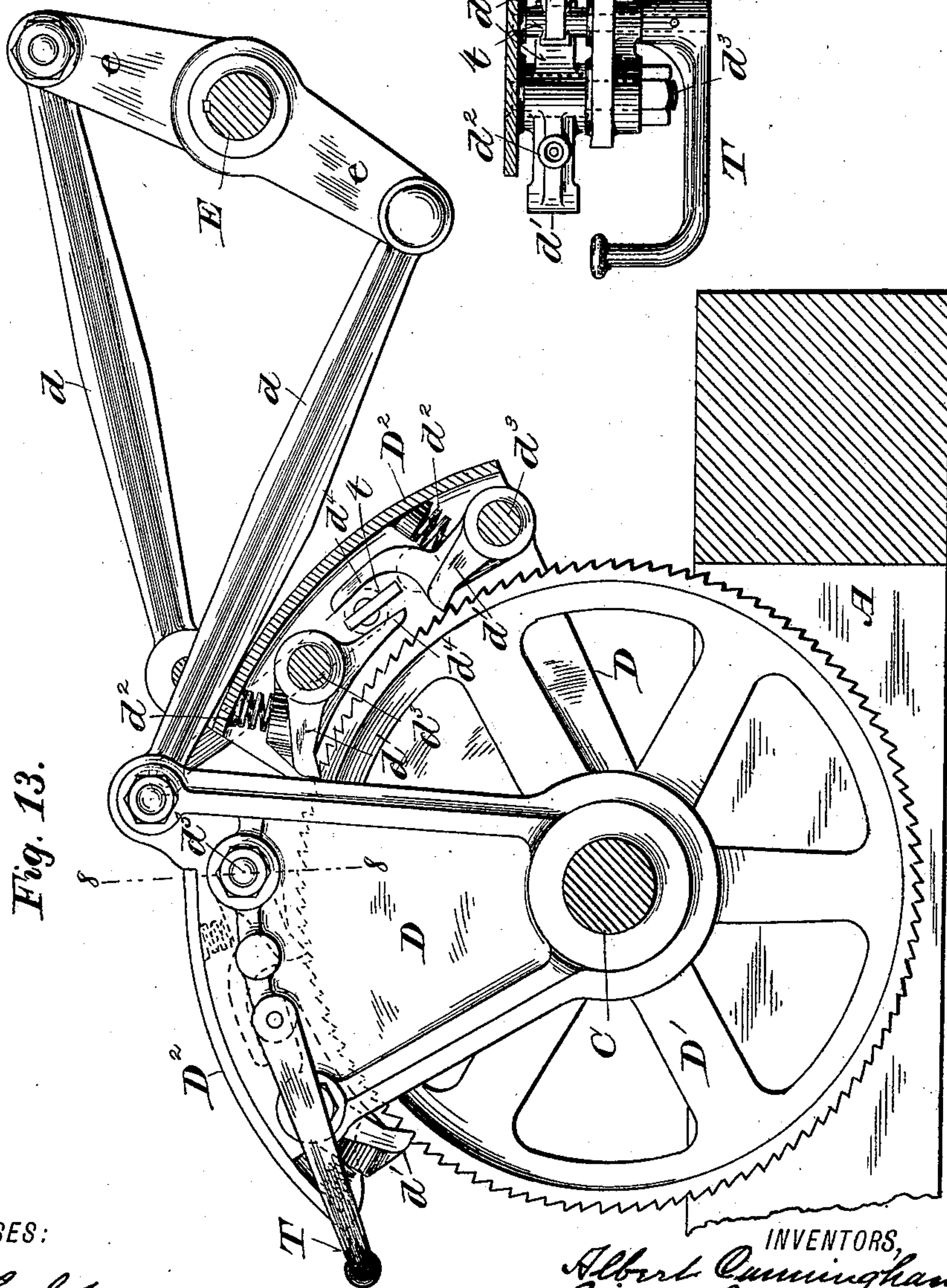


Fig. 13.



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UNITED STATES PATENT OFFICE.

ALBERT CUNNINGHAM AND ERNST J. MULLER, OF MILWAUKEE, WISCONSIN.

SAW-MILL SET-WORKS.

SPECIFICATION forming part of Letters Patent No. 407,334, dated July 23, 1889.

Application filed March 23, 1887. Serial No. 232,078. (No model.)

To all whom it may concern:

Be it known that we, ALBERT CUNNINGHAM and ERNST J. MULLER, both of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Saw-Mill Set-Works; and we do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

The main objects of our invention are, first, to recede the knees by power derived from the movement of the carriage; second, to rigidly support the pawls which operate the set-shaft; third, to prevent the transmission to the hand of the operator of the shock produced by the setting-arm striking the stop at the limit of its throw; fourth, to adjust the head-blocks on the carriage-frame; fifth, to align the knees; sixth, to adjust the throw of the pawl-carriers with reference to the ratchet-wheel; seventh, to readily change the graduation of the setting-arc, and, eighth, to facilitate the setting of the knee-actuating pinion and to provide bearings or supports for the set-shaft in the head-block on each side of said pinion.

It consists, essentially, of certain peculiarities in the construction and arrangement of the mechanism by which the foregoing objects are attained, and hereinafter fully set forth.

In the accompanying drawings like letters designate the same parts in the several figures.

Figure 1 is a plan view of a portion of a saw-mill carriage embodying our improvements. Fig. 2 is a side elevation of the same. Fig. 3 is a vertical cross-section of the carriage, showing, partly in side elevation and partly in section on the line 9 9, Fig. 9, on an enlarged scale, one of the head-blocks and its attachments. Fig. 4 is a plan view of the removable section of the knee. Fig. 5 is a section of the taper attachment, taken on the line 6 6, Fig. 3. Fig. 6 is a section of the receding mechanism, taken on the line 2 2, Figs. 1

and 2. Fig. 7 is a section on the line 5 5, Fig. 6, showing the spring-catch by which the lever controlling the receding mechanism is held in its middle position. Fig. 8 is a detail view of one of the brackets in which the receding-lever is fulcrumed. Fig. 9 is a cross-section of one of the head-blocks on the line 7 7, Fig. 3, showing a split pinion and its immediate connections. Fig. 10 is a section on the line 3 3, Figs. 1 and 2, showing the setting-lever and arc and the index-wheel. Fig. 11 is a front elevation of said setting-lever, arc, and quadrant. Fig. 12 is a view of a modified form of the quadrant and detachable scale. Fig. 13 is a section on the line 4 4, Figs. 1 and 2, showing the ratchet-wheel, pawl-carriers, and pawls. Fig. 14 is a plan view of our pawl-carrier with the cap-plate broken away to disclose the pawls underneath, and Fig. 15 is a cross-section on the line 8 8, Figs. 13 and 14, of one of the pawl-carriers.

A represents the carriage-frame, of the usual or any suitable form and construction, mounted in the usual way upon axles *n n*, and wheels *N N*, arranged to travel on rails or ways *O O* parallel with the saw.

B is a head-block longitudinally slotted and grooved, as seen in Figs. 1, 2, 3, and 9, to receive and provide ways for the knee *K*, working therein transversely to the carriage. It is secured to the side rails of the carriage by the vertical bolts *a a* and horizontal tie-bolts *a' a'*, secured at their inner ends in cross-webs *b b* of the head-blocks and at their outer ends in the side rails of the carriage-frame A. The ears through which the vertical bolts *a a* pass, being slotted, permit of the endwise movement and adjustment of the head-block B upon the carriage-frame by means of the bolts *a' a'*.

K is the standard or knee cored out at its base, as shown in Figs. 3 and 5, to receive the casting *P²* and the rack *B'*, which is grooved on each side to work with inwardly-projecting tongued ways formed therefor on said knee, as seen most clearly in Fig. 5.

Referring to Figs. 3 and 5, the casting *P²*, formed with an opening to receive the block *p'* and spring *p⁴*, is connected at one end, by means of a slotted ear *p⁶* and bolt *b'*, with

ears formed on rack B', and at the other end with an ear b^3 on said rack by adjusting-bolts $b^2 p^5$, by means of which said casting P² may be moved lengthwise of said rack and the knees brought into exact alignment with each other.

P is a hand-lever pivoted in the knee K, and fulcrumed at its lower end to the block p^1 , which has a slight vertical movement in casting P² to permit of the oscillation of said lever, and bears at the rear side against a yielding block p^7 . The spring p^4 bears at one end against the block p^7 and at the other end against the washer p^8 , resting against the point of the bolt p^3 , by which the tension of the spring p^4 may be regulated as desired.

P' is a notched arc attached to the knee K, and with which the spring-catch p in lever P engages and holds said lever in any desired position.

$p^2 p^2$ are two metallic plates adjustably secured to the knee K, and bearing against opposite sides of the hub of lever K to exclude dirt from said knee. To reach the bolts $b^2 p^5$ for the adjustment of the casting P², we provide a hinged or removable section or lid K' in the base of the standard K, as shown in Figs. 3 and 4.

C is the set-shaft, mounted in the usual way lengthwise of the carriage A in suitable bearings provided therefor. Upon it are mounted a split pinion C² and collar C³ for each head-block and standard, and the bevel-gear C', ratchet-wheel D', and pinion r .

Referring to Fig. 9, the pinion C² is formed in two sections c^1 and c^2 , the former rigidly fixed upon the set-shaft C and the latter mounted loosely thereon. C³ is a collar, preferably formed in two sections, rigidly clamped upon the set-shaft by bolts, as shown in the drawings, and turned down on the outer face to work in a bearing formed therefor in the head-block B, and thereby support the set-shaft at that point. The opening in the head-block B, in which the collar C³ bears, is made of sufficient size to allow the pinion C² and its attachments to be passed through it into place in said head-block. A spring c coiled about the set-shaft is secured at one end in the loose section c^2 of the split pinion and at the other end in the collar C³, which may be adjusted and set upon the shaft C, so as to strain the spring c as desired.

Referring to Figs. 1, 2, and 6, J represents a yoke journaled upon the set-shaft C each side of the bevel-gear C' and formed with a transverse sleeve, in which the shaft h^3 is supported and bears. Upon the inner end of said shaft is fixed the bevel-gear d^2 , working with the gear C' on the set-shaft, and upon its outer end is secured the friction-wheel H, arranged to work when desired with a friction-wheel N', attached to a carriage wheel or axle provided in its outer face with handles $h' h'$, by means of which the knees may be moved by hand.

L is a lever fulcrumed in brackets L' L'

above the outer end of yoke J and formed at the lower end with a projection, which is connected with said yoke by a link l .

h is a brake-strap passing over the friction-wheel H and secured at the ends in ears formed therefor on brackets L' L' and overhanging the side of the carriage-frame, as seen in Figs. 2 and 8.

L' is a spring-catch secured to the bracket L², as seen in Figs. 6 and 7, and bent to retain the lever L in its middle position and the friction-wheel H out of contact with the driver N' and brake-strap h .

E is a rock-shaft supported in brackets secured to the carriage-frame A on the side opposite the saw and parallel with the set-shaft C. Upon the shaft E are fixed the pawl-actuating arms $e e$ and setting-arm I.

Referring to Figs. 10 and 11, F is a graduated arc notched and provided with a lug f^3 on one edge. It is mounted upon and adjustably secured at the ends to the periphery of the quadrant F' by means of eyebolts $f f$, hinged to its ends, passing through ears $f^4 f^4$ on said quadrant and provided with the adjusting and retaining nuts $f' f'$, by means of which said arc F may be moved longitudinally over the periphery of quadrant F'.

G is a latch-arm loosely mounted upon the rock-shaft E and retained in place thereon between the hub of the setting-lever I and the collar g^2 . It is provided at its free end with a spring-actuated stop-latch g , arranged to engage the notches in the adjacent edge of the arc F and hold the arm G in any position, thus limiting the throw of the setting-arm I and pawl-carriers as desired.

i is a sliding block arranged to be interposed between the arm I and stop-latch g and thus change the throw of the setting-arm by a fractional part of the distance between two notches. To the setting-arm I inside of the segment F' is secured the lever I', which has a bend or offset and rises on the opposite side of said segment to said arm I, as seen in Fig. 11, so as to give it a little elasticity and relieve the hand of the operator of the shock produced by the setting-arm striking the stops f^3 and g . In place of the offset or bend in the lever I' it may have any other form of yielding or interposed spring-connection with the arm I.

R' is an index-wheel formed with or secured to the gear R, which works with and is operated by a pinion r on the set-shaft.

r' is an index indicating upon the index-wheel R' the position of the standards K K with reference to the saw.

Fig. 12 shows a modified construction in which the graduated arc F² is detachably secured to the quadrant F' by countersunk bolts $f^2 f^2$.

Referring to Figs. 13, 14, and 15, D D represent pawl-carriers loosely mounted on the set-shaft C—one on each side of the ratchet-wheel D'—and connected by the rods $d d$ with the arms $e e$ on rock-shaft E, by means of

which said pawl-carriers are swung past each other alternately forward and back. The pins or bolts d^3 d^3 , upon which each set of pawls d' d' and the connecting-rod d are journaled, are secured at one end in an arc-shaped angle-iron cap D^2 and at the other end in the pawl-carrier D . The bearings of the pawls d' d' are thus connected and rigidly held in place at both ends and the pawls d' d' incased and protected.

t is a shaft or spindle journaled in each pawl-carrier between its two pawls d' d' and provided with wings or projections arranged to engage projections d^4 d^4 of the pawls d' d' and lift the latter out of engagement with the ratchet-wheel D' . To the outer end of each of said spindles t is attached a crank-arm T , by which it is operated.

The line 1 1, Fig. 1, indicates the plane of the saw, and the arrows, Figs. 1 and 2, the direction of the forward movement or feed of the carriage.

As usually constructed, the head-blocks have flanges bearing against the inner vertical faces of the side rails of the carriage and are brought into alignment by inserting wedges or shims where they are required between such flanges and side rails. We form our head-blocks without flanges to bear against the side rails of the carriage and bring them into alignment with each other by loosening the nuts of the bolts a a and turning the tie-bolts a' a' so as to produce the required adjustment. The nuts of the bolts a a are then tightened and the head-blocks thereby rigidly secured in place.

To bring the knees K into alignment with each other, the taper levers P being in their normal position, the castings P^2 , through which said levers are connected with the racks B' , are adjusted lengthwise, as required, by loosening the nut on bolt p^5 and advancing the set-bolt b^2 , or vice versa. Access is had to said adjusting-bolts by removing the section or cover K' . The spring p^4 , forming an elastic connection between the levers P and racks B' , relieves the connections between the set-shaft and knees of the shock of a log striking forcibly against the latter, and thereby prevents injury or breakage of said parts. The spring c , acting upon section c^2 of the split pinion C^2 , takes up all wear and play between said pinion and the rack B' , with which it works, and the collar c^3 , bearing in the head-block B , supports the set-shaft C at that point and tends to maintain said split pinion rigidly in its proper working position with reference to said rack. To run the knees back, the operator carries the lever L to the right, as seen in Fig. 6, thus depressing the yoke J at its outer end and bringing the friction-wheel H into engagement with the driver N' , attached to one of the carriage-wheels N . The carriage-axle n having vertical play in the box n' permits the weight of the carriage to be shifted from said box and the adjacent carriage-

wheels to the friction-driver N' , thus increasing the traction of the carriage-wheel N , to which said friction-driver is attached, by whatever force is applied to the lever L . Operating through the gears h^2 and C^2 upon the set-shaft C , said friction-wheels thus move the standards away from the saw side of the carriage in "gigging." When said standards have been run back to the desired position, the lever L is reversed and the friction-wheel H lifted into engagement with the strap h , which instantly arrests its movement. The lever L is then carried to its middle position, where it is retained by the spring-catch l' . When a log is rolled upon the head-block, the pawls d' d' having been thrown out of engagement with the ratchet-wheel D' to prevent injury thereto, the friction-wheel H is lifted by lever L into engagement with the brake-strap h , and the knees thus prevented from being forced farther back by said log. To cause the pawls d' d' to work properly with the ratchet-wheel D' , and to prevent lost motion when the movement of the pawl-carriers D is reversed, the strap or arc F with the stops f^3 and g is so adjusted as to limit the throw of the setting-arm I at points where both sets of pawls d' d' will be in proper or correct engagement with teeth of the ratchet-wheel D' . The plates D^2 , connecting the ends of the pins d^3 d^3 overhanging the ratchet-wheel D' , brace and support them on that side and insure firm unyielding bearings for the pawls d' d' . When it is desired to use a saw of different kerf or employ a different scale of thickness, the arc F may be readily removed and replaced by another having the desired graduation.

We claim—

1. The combination, in a saw-mill carriage, of the carriage-frame, a head-block movable endwise thereon, and adjusting-bolts secured in the side rails of said carriage and connected with and acting horizontally in opposite directions upon said head-block, substantially as and for the purposes set forth.

2. The combination, in a saw-mill carriage, of the carriage-frame, a head-block mounted thereon, and adjusting-bolts secured at their inner ends to said head-block and passing horizontally outward and secured in or to the side rails of said carriage-frame, substantially as and for the purposes set forth.

3. The combination, in a saw-mill carriage, of a head-block, a rack movable longitudinally therein, a knee movable transversely to the carriage and capable of longitudinal movement with reference to said rack, and a lever pivoted to said knee and having a horizontally-adjustable connection with said rack, substantially as and for the purposes set forth.

4. The combination, in a saw-mill carriage, of a head-block, a knee movable transversely to the carriage and provided with a rack, a block or frame having a vertically-movable pivot-block and adjustably attached to said

rack, and a lever pivoted to the knee and fulcrumed to said vertically-movable block, substantially as and for the purposes set forth.

5 The combination, in a saw-mill carriage, of a head-block, a knee movable transversely to the carriage and provided with a movable rack, and a lever pivoted to said knee and having a horizontally-yielding connection with said rack, substantially as and for the
10 purposes set forth.

6. The combination, in a saw-mill carriage, of a head-block, a knee movable therein transversely to the carriage and provided with a rack, a frame or block adjustably attached to
15 said rack and carrying a yielding block, and a lever pivoted to said knee and fulcrumed in said yielding block, substantially as and for the purposes set forth.

7. The combination, in a saw-mill carriage,
20 of a longitudinally-slotted head-block, a knee arranged to slide therein transversely to the carriage, a rack movable longitudinally on ways in the base of said knee, a yoke or frame adjustably attached to said rack and recessed
25 to receive a vertically-sliding and horizontally-yielding block, and a lever pivoted to said knee and connected with said yielding block, substantially as and for the purposes set forth.

8. The combination, in a saw-mill carriage,
30 of a head-block, a knee movable transversely to the carriage in ways provided therefor in said head-block, a rack movable lengthwise in ways formed in the base of said standard, a yoke or frame connected at one end by a
35 slotted ear and at the other end by an adjusting bolt or bolts to said rack, a vertically-sliding block inserted in a recess in said frame, a spring acting against one side of said block, an adjusting-bolt for regulating the tension
40 of said spring, and a lever pivoted to said knee and connected with said vertically-sliding block, substantially as and for the purposes set forth.

9. The combination of a shaft, a split pin-
45 ion, one section of which is fixed and the other section loosely mounted upon said shaft, a collar fixed upon said shaft and bearing in a fixed box, and a spring connecting said collar and the loose section of said pinion, substan-
50 tially as and for the purposes set forth.

10. The combination, in a saw-mill carriage, of a head-block, a knee movable transversely to the carriage in ways formed therefor in
55 said head-block, a set-shaft, a split pinion, one section of which is fixed and the other section loosely mounted upon said set-shaft, a collar fixed upon said set-shaft and bearing in a box formed in said head-block, and a
60 spring connecting said collar with the loose section of said pinion, substantially as and for the purposes set forth.

11. The combination, in a saw-mill carriage, of a head-block, a knee movable thereon transversely to the carriage, a set-shaft, a split
65 pinion, one section of which is fixed and the other section loosely mounted upon said set-shaft, a collar adjustably secured on said set-

shaft and having a bearing in said head-block, and a spring connecting said collar with the loose section of said pinion, substantially as
70 and for the purposes set forth.

12. The combination, in a saw-mill carriage, with the set-shaft and knees, of a transverse shaft mounted in a yoke hinged upon said set-
75 shaft, a gear fixed upon said transverse shaft and working with a gear on the set-shaft, a friction driving-wheel secured to a carriage axle or wheel, a driven friction-wheel fixed
80 upon the outer end of said transverse shaft over said friction driving-wheel, a fixed brake strap or shoe working with the upper face of
85 said driven friction-wheel, and a lever connected with said yoke and arranged to carry the driven friction-wheel into engagement with the driving friction-wheel or brake, sub-
stantially as and for the purposes set forth.

13. The combination, in a saw-mill carriage, with the set-shaft and knees, of a transverse shaft geared therewith and bearing in a yoke
90 hinged upon said set-shaft, a paper friction driving-wheel attached to a carriage wheel or axle, which is capable of vertical movement in its adjacent box, a driven friction-wheel
95 mounted upon said transverse shaft vertically, or nearly so, over said friction driving-wheel, whereby the force exerted to produce engagement of said driving and driven friction-wheels acts to increase the traction of said
100 carriage-wheel, and a lever connected with and arranged to move said driven friction-wheel vertically, substantially as and for the purposes set forth.

14. The combination, in a saw-mill carriage, with the set-shaft, a ratchet-wheel fixed there-
105 on, vibrating pawl-carriers provided with pawls working with said ratchet-wheel, and a setting-lever arranged to operate said pawl-carriers, of a quadrant provided with a graduated arc or strap made detachable therefrom
110 to permit of the substitution in its place of arcs or straps having different graduations, a stop fixed relatively to said arc, and a stop movable longitudinally of said arc or strap
115 and arranged to engage the setting-lever at different points in said arc corresponding to its graduation, substantially as and for the purposes set forth.

15. The combination, in a saw-mill carriage, with a set-shaft and knees, of a rock-shaft
120 carrying pawl-actuating arms and a setting-arm, vibrating pawl-carriers connected with the arms on said rock-shaft, a ratchet-wheel on said set-shaft operated by the pawls in
125 said carriers, a longitudinally-adjustable setting-arc provided with a fixed stop, and an adjustable stop movable lengthwise of said arc, said stops being arranged to engage said setting-arm and limit the angular movement
130 thereof, substantially as and for the purposes set forth.

16. The combination, in a saw-mill carriage, with the set-shaft, ratchet-wheel, and vibrat-
ing pawl-carrier, of a rigid setting-arm, stops arranged to limit the throw of said setting-

arm, and a yielding or elastic actuating-lever, substantially as and for the purposes set forth.

17. The combination, in a saw-mill carriage, with the knees and set-shaft, of a ratchet-wheel fixed upon said set-shaft, a rock-shaft provided with arms and an actuating-lever, vibrating pawl-carriers journaled on said set-shaft, one on each side of said ratchet-wheel and each provided with pins projecting transversely over the face of said ratchet-wheel, one or more pawls and a link journaled upon said pins in each pawl-carrier, said link acting in a direct line with said pawls and connecting said pawl-carrier with an arm on said rock-shaft, and a cap-plate secured to and connecting the inner ends of the pins of each pawl-carrier, substantially as and for the purposes set forth.

18. The combination, in a saw-mill carriage, with the knees and set-shaft, of a ratchet-wheel fixed upon said set-shaft, a rock-shaft

provided with a cross-head and an actuating-lever, vibrating pawl-carriers journaled on said set-shaft, one on each side of said ratchet-wheel and each provided with pins overhanging the face of said ratchet-wheel, one or more pawls and a link journaled upon said pins in each carrier, said link acting in a direct line with said pawls and connecting said pawl-carrier with the cross-head on said rock-shaft, and an angle-plate secured to and connecting the inner ends of the pins of each carrier and covering the pawl-bearings therein, substantially as and for the purposes set forth.

In testimony that we claim the foregoing as our own we affix our signatures in presence of two witnesses.

ALBERT CUNNINGHAM.
ERNST J. MULLER.

Witnesses:

CHAS. L. GOSS,
JOHN H. VORSTMAN.