(No Model.) 3 Sheets—Sheet 1.

W. L. RAYNES.

SAW MILL SET WORKS.

No. 357,032. Patented Feb. 1, 1887.

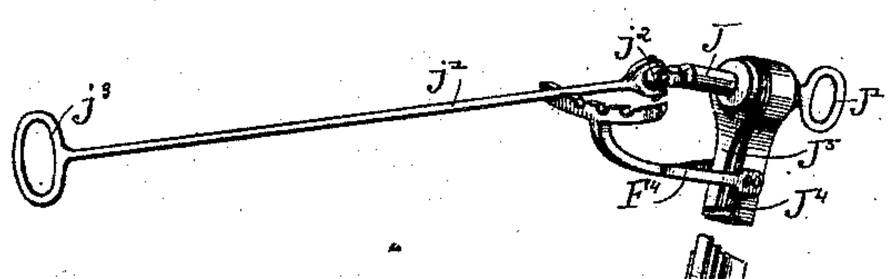

Fig. 1.

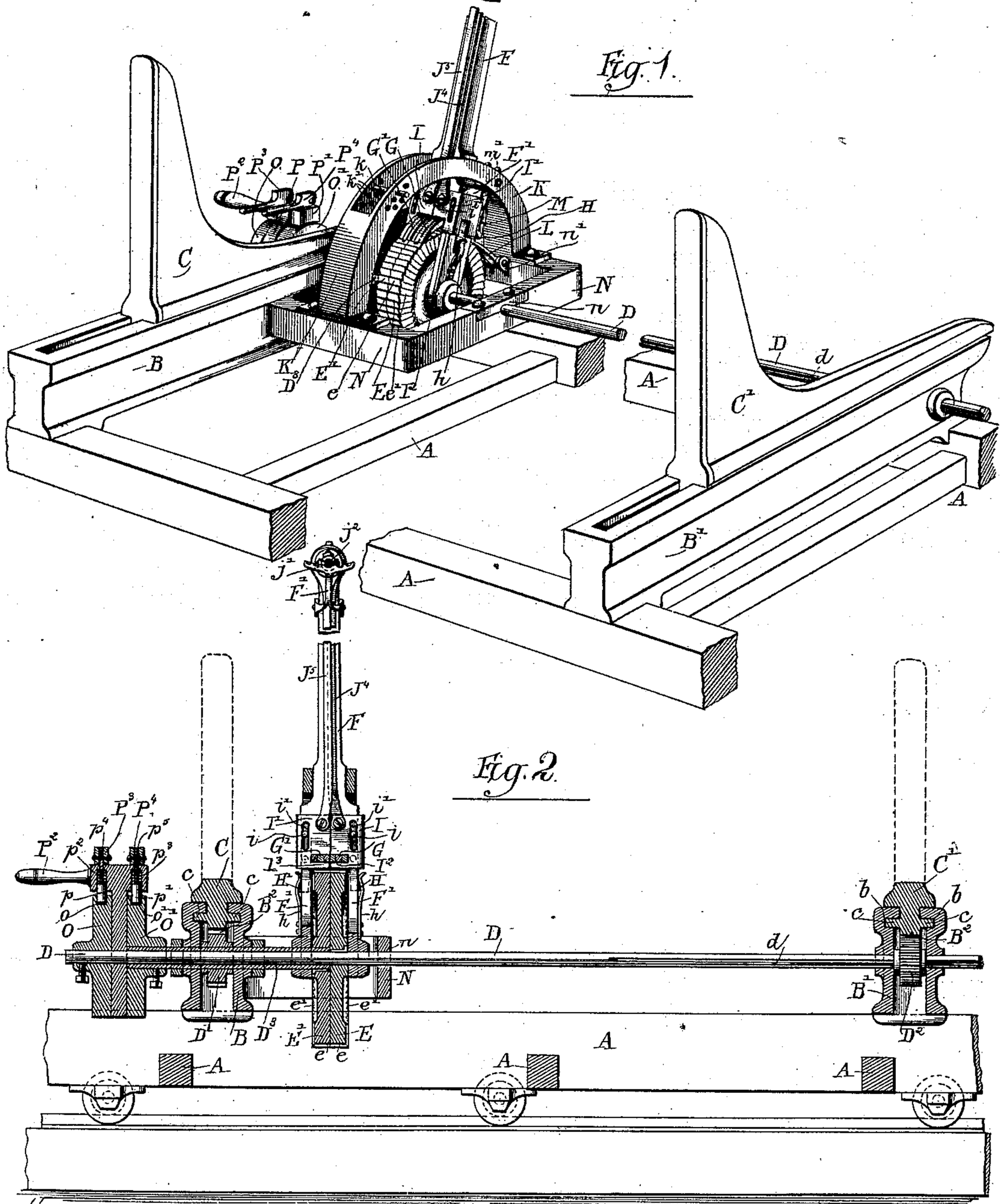

Fig. 2.

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Fig. 5.

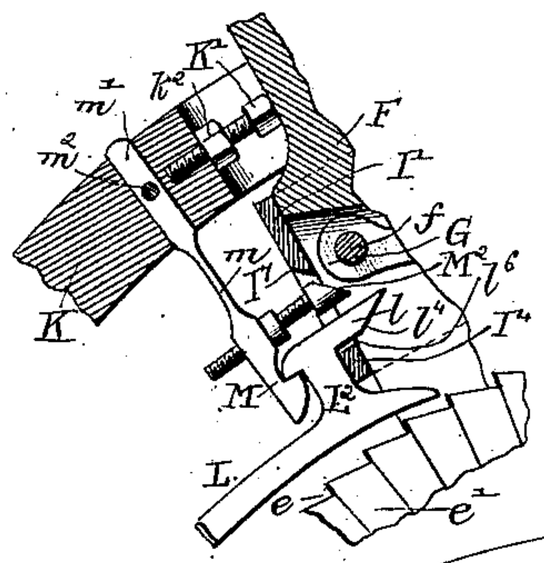


Fig. 3.

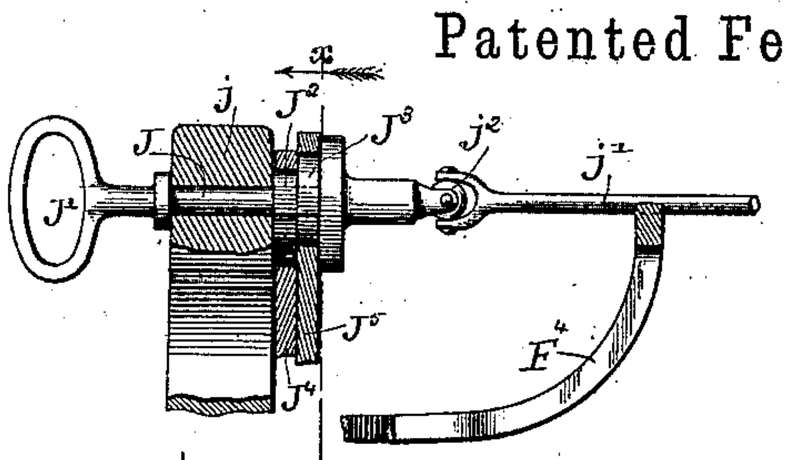
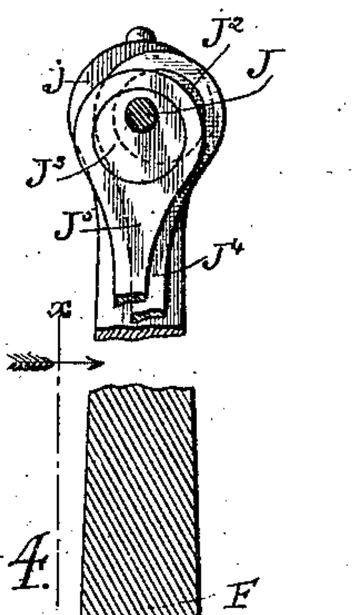


Fig. 4.



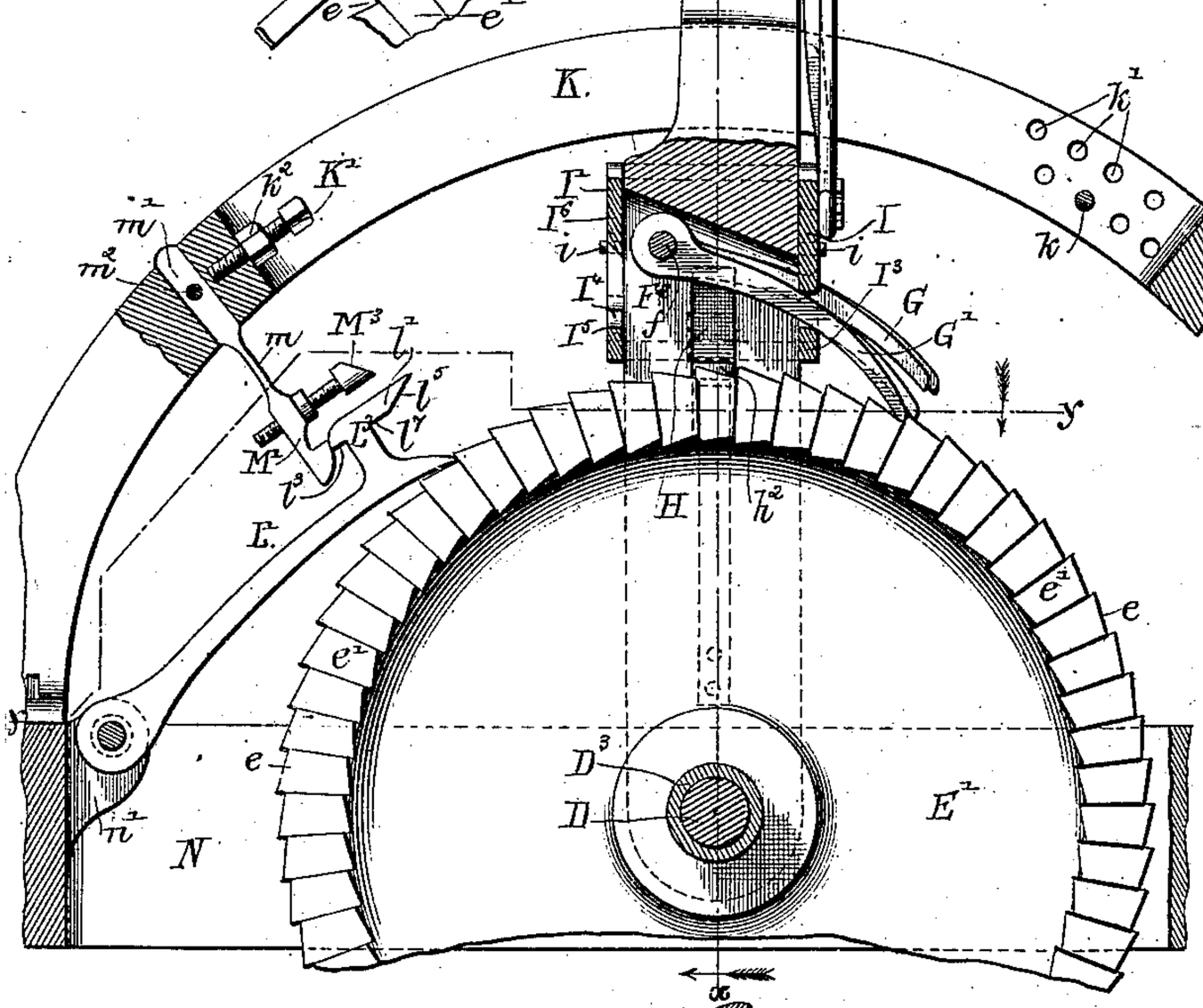


Fig. 6.

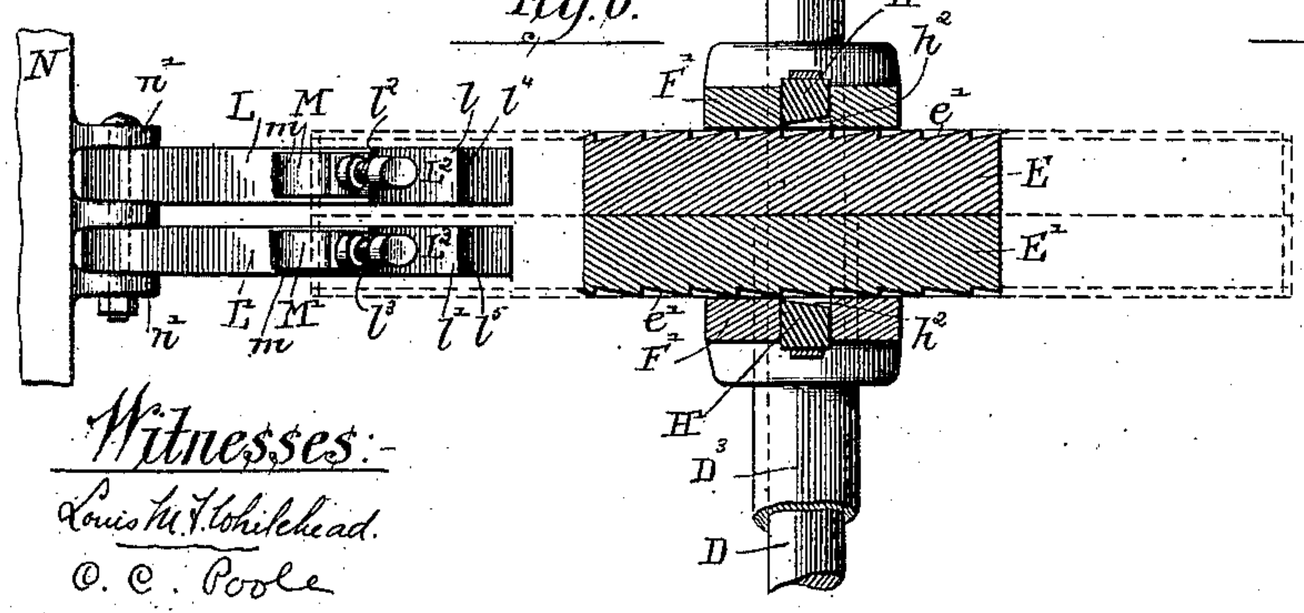
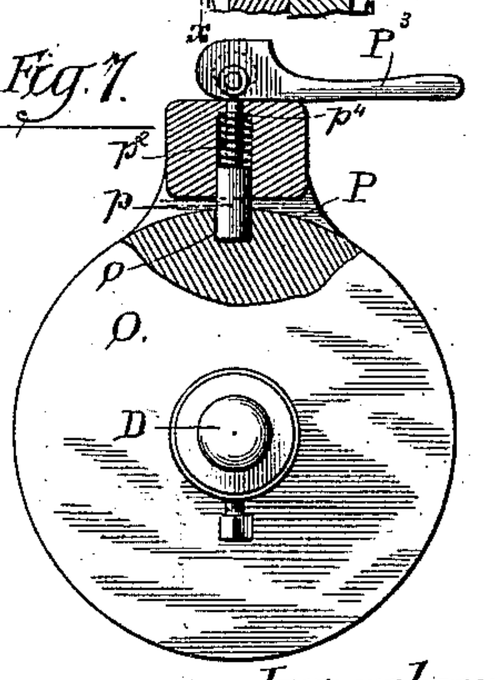


Fig. 7.



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(No Model.) 3 Sheets—Sheet 3.

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SAW MILL SET WORKS.

No. 357,032. Patented Feb. 1, 1887.

Fig. 8.

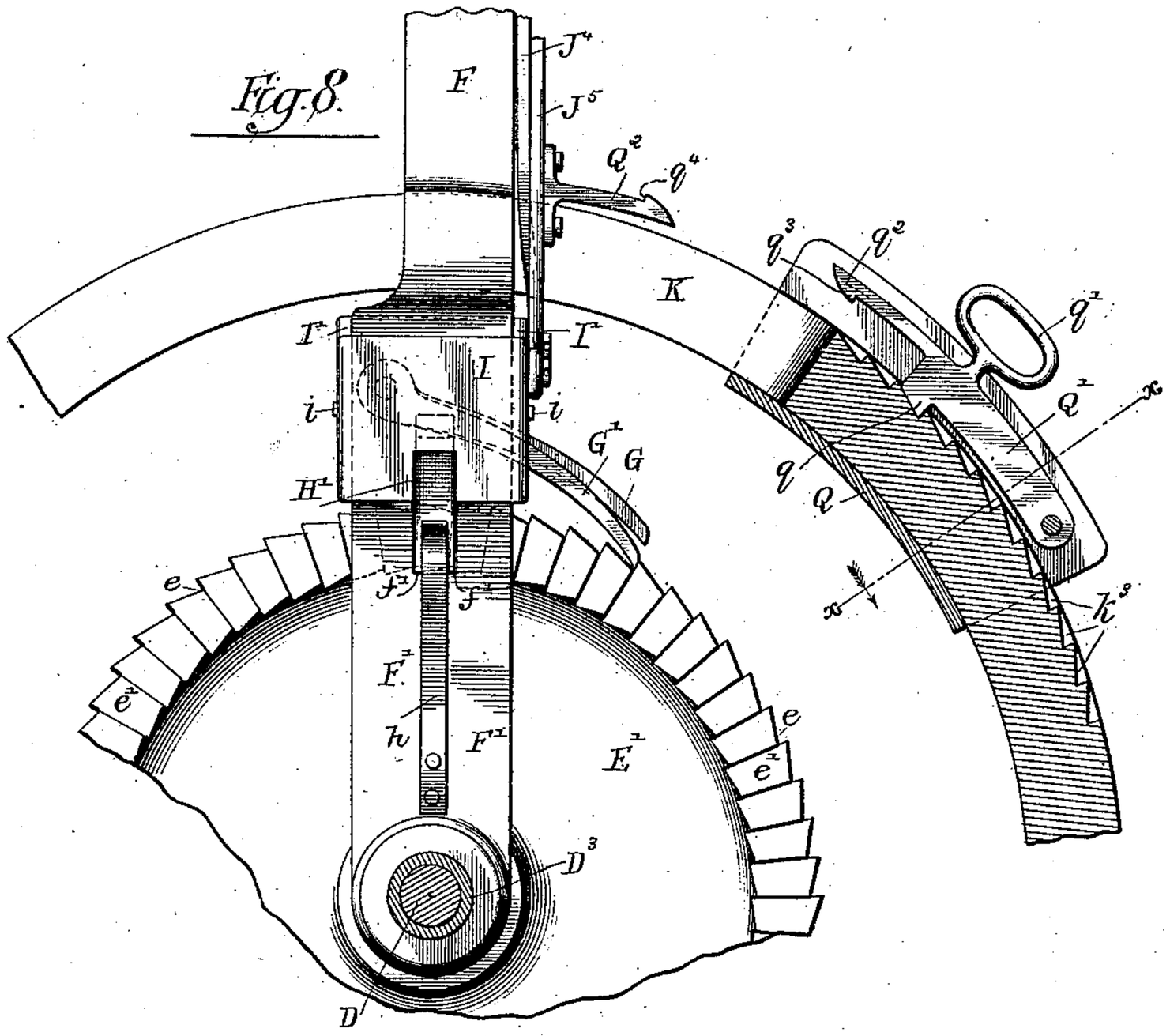
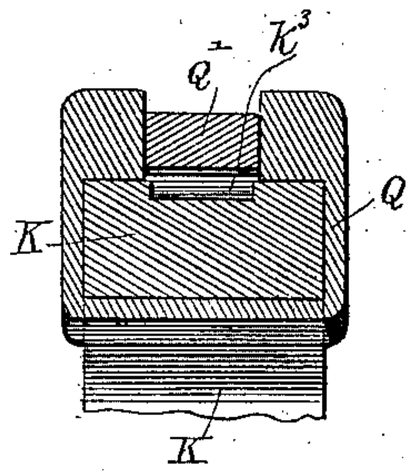


Fig. 9.



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UNITED STATES PATENT OFFICE.

WARREN L. RAYNES, OF MONTEZUMA, INDIANA.

SAW-MILL SET-WORKS.

SPECIFICATION forming part of Letters Patent No. 357,032, dated February 1, 1887.

Application filed April 29, 1886. Serial No. 200,564. (No model.)

To all whom it may concern:

Be it known that I, WARREN L. RAYNES, of Montezuma, in the county of Parke and State of Indiana, have invented certain new and useful Improvements in Knee-Actuating Devices for Saw-Mill Carriages; 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 reference marked thereon, which form a part of this specification.

This invention relates to the log supporting and holding devices upon a saw-mill carriage, and more especially to devices for moving the knees or horizontally-sliding abutments upon the "head-blocks" or transverse pieces of the carriage by which logs are immediately sustained while being sawed.

A principal object of this invention is to provide an improved means whereby the attendant or sawyer, standing in one place and operating a single movable part or lever, may move both or all of the knees together for the purpose of advancing the log bodily toward the saw, or for returning said knees into position to take another log, or may move either of said knees either forward or backward independently of the other knee or knees for the purpose of setting one of said knees in advance of the other knee or knees, as may be necessary in operating upon tapered logs, or under other circumstances.

To this and other ends, as will hereinafter appear, my invention consists in the matters hereinafter described, and pointed out in the appended claims.

In a form of device for actuating the sliding knees of a saw-mill carriage heretofore commonly employed a rotative shaft is mounted in the carriage at right angles to the head-blocks, said shaft being provided with pinions engaging toothed bars or racks upon the knees and with a ratchet-wheel, and an oscillating hand-lever, carrying a pawl or pawls, is employed for turning the ratchet-wheel, so as to rotate the shaft for moving the knees.

The device herein shown as embodying my invention embraces the same general features of construction above set forth; but in this case one of the pinions, instead of being secured directly to the shaft, is mounted upon a hollow sleeve surrounding said shaft, and instead of one ratchet-wheel two ratchet-wheels are used, located side by side, one of said ratchet-wheels being fixed upon the shaft and the other attached to said sleeve. For actuating the ratchet-wheel an oscillating arm is provided having two sets of pawls, which pawls are controlled by a handle connected with the said oscillating lever in such manner that either or both of said ratchet-wheels may be engaged by the lever in a manner to turn either the shaft or sleeve backward or forward one independently of the other, or both together, at the will of the operator. Certain details of construction in a device of the character described, whereby the operation of said device is rendered more perfect, are herein provided, as will hereinafter fully appear.

The invention may be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a perspective view of a saw-mill carriage constructed in accordance with my invention. Fig. 2 is a longitudinal vertical section of the same, taken axially through the longitudinal shaft shown in Fig. 1. Fig. 3 is an enlarged detail sectional view taken upon the line *x x* of Fig. 4, and showing one of the ratchet-wheels upon the shaft in side view and the oscillating lever for actuating said ratchet-wheels in section. Fig. 4 is a sectional view of the parts shown in Fig. 3, taken upon line *x x* of said figure. Fig. 5 is a detail view of certain parts shown in Fig. 3, illustrating a changed position thereof. Fig. 6 is a plan section taken upon line *y y* of Fig. 3. Fig. 7 is a detail view of the disks shown upon the end of the shaft in Fig. 2. Fig. 8 is a sectional view illustrating a movable block applied to the segmental guides in place of the pin shown in Fig. 3, for the purpose of limiting the oscillatory movement of the lever. Fig. 9 is a detail section of the same, taken upon the line *x x* of Fig. 8.

In the said drawings, A A indicate the frame-pieces of the carriage; B B′, the head-blocks, and C C′ the knees. Said knees are, as shown, constructed in the usual manner, with lateral flanges *c c* engaging guide-grooves *b b* in the head-blocks, and with rack-bars B^2 B^2, Fig. 2.

D is a longitudinal shaft having bearings in the rear portion of the head-blocks B B′, and

D′ D² are pinions engaging said rack-bars B² B², the pinion D² being mounted upon the said shaft D and the pinion D′ being secured to a tubular shaft or sleeve, D³, surrounding and adapted to turn upon the said shaft in its part adjacent to the head-blocks B, and extending at its ends a short distance outside of the bearings in the head-blocks, as clearly shown in Fig. 2.

E E′ are two ratchet-wheels located side by side, one of said ratchet-wheels being secured upon the shaft D, adjacent to the end of the sleeve D³, and the other, E′, to the said sleeve near its end and adjacent to the wheel E. Said ratchet-wheels are provided with the usual ratchet-teeth, *e*, upon their edge, and with other ratchet-teeth, *e′*, upon the marginal parts of their outer side faces, said ratchet-teeth *e* and *e′* being oppositely inclined or adapted for engaging oppositely moving or directed pawls.

F is a lever mounted to oscillate about the central axis of the shaft D, and supported, as shown, by two forks or arms, F′ F′, located upon opposite sides of the ratchet-wheels E E′, and having bearings one upon the said shaft and the other upon the sleeve D³. Said lever F is provided with two pawls, G G′, arranged side by side and engaging the peripheral ratchet-teeth *e* of the wheels E and E′ respectively, and also with two other laterally-located pawls, H H′, adapted to engage the outer ratchet-teeth, *e′*, upon said wheels E E′. The pawls G G′ are, as more clearly shown in Fig. 3, made to act by gravity in engaging the ratchet-teeth *e e*, and the pawls H H′ are thrown and held by springs *h h* in position to engage the ratchet-teeth *e′*. The pawls G G′ and peripheral ratchet-teeth *e e* are, furthermore, adapted and arranged to give the forward or feed movement of the knees C C′ toward the saw, and the lateral ratchet-teeth *e′ e′* and pawls H H′ to give the return or backward movement to said knees. In order to give the required accuracy of movement to the parts in feeding the log forward toward the saw, and to prevent lost motion between the lever and ratchet wheel or wheels at such time, the pawls G G′ are each, as shown, made in several separately movable parts, in a familiar manner.

From the construction above described it is entirely obvious that the knees C and C′ may be moved separately or together, either backward or forward, by turning one or the other or both of the ratchet-wheels E E′. In order to provide means for controlling the several pawls G G′ and H H′, so as to cause either or both of the said wheels to be turned either backward or forward in the oscillatory movement of the lever F, devices are herein provided as follows:

I I′ are two movable plates, adapted to slide longitudinally upon the lever F in its part adjacent to the pawls G G′ H H′. Said plates, as shown, each extend around the sides and upon the front and rear faces of the lever, and are provided upon the front face thereof with a horizontal cross-bar or projection, I² I³, Fig. 2, extending beneath the pawls G G′ in such manner as to lift said pawls free from the wheels E E′, when the plates are lifted or slid upwardly upon the lever, said pawls, as shown, being located partially within a recess, F², Figs. 3 and 4, formed in said lever, and sustained upon a pivot-pin, *f*, extending through the upper rear part of the recess, with their free ends protruding from the recess in position to rest upon the ratchet-wheels. The plates I I′ are, as shown, held in place upon the lever by pins *i i*, fixed in the front and rear faces of the latter and passing through slots *i′ i′* in the plates; but the particular means whereby the said plates are held and guided upon the lever is obviously unimportant, and any suitable construction in the parts may be employed for this purpose.

The pawls H H′, which, as before stated, are located at the sides of the lever F, are preferably arranged longitudinally with relation to said lever, and are pivoted in recesses *f′ f′*, formed in the arms F′ F′ thereof, by means of pivot-pins *f² f²*, said pawls being provided upon their lower free ends with transversely-inclined faces *h²*, Fig. 6, adapted for engagement with the lateral ratchet-teeth *e′* upon the ratchet-wheels. The said pawls H H′ are prolonged upwardly beyond their pivots *f² f²*, to form arms *h³*, which are extended to points adjacent to and beneath the sliding plates I I′, and are provided with inclined or cam faces *h⁴*, arranged to engage the said plates in such manner that when said plates are depressed or slid toward the ratchet-wheels the arms *h³* will be thrust inwardly and the pawls released from the wheels, and when the said plates are lifted the arms will be released and the pawls thrown inwardly by the springs *h h′*.

From the construction of the several pawls and the sliding plates I I′ described, it is entirely obvious that when said plates are depressed the pawls G G′ will be engaged with and the pawls H H′ released from the ratchet-wheels, and that when the plates are slid upwardly or outwardly upon the lever the said pawls G G′ will be lifted out of engagement with the ratchet-wheels and the pawls H H′ allowed to engage the latter. It follows that by moving the plates I I′ up or down the ratchet-wheels and knees may be moved either backward or forward at pleasure, and, inasmuch as the said plates are independently movable, that by moving one or the other of said plates either of said wheels and knees may be moved either backward or forward, as desired, without any corresponding movement of the other wheel and knee.

For the purpose of shifting the plates I I′, either separately or together, for the purpose stated, I have provided at the upper end of the lever F a revolving shaft, J, mounted in a suitable bearing, *j*, at the upper end of the lever, and provided with a cross-bar or handle, J′, by which it can be turned by an attendant near the carriage, and also preferably

with a rod, j', connected with the shaft J by means of a knuckle or universal joint, j, and extending over the carriage and a log which may be supported thereon to a point within reach of the sawyer, who controls the movements of the carriage and other parts of the mill, said rod being provided with a cross-bar or hand-hold, j^3. A supporting-bar, F^4, is herein shown as attached to the lever F, in position to sustain the rod J′ in an approximately horizontal position, so as to prevent said rod from falling in the way of the log. Upon the said shaft J are secured two eccentrics, J^2 J^3, arranged preferably in such manner that lines drawn radially of the shaft through their points of greatest eccentricity will be at right angles with each other. Said eccentrics are engaged with suitable apertures in the upper ends of two eccentric bars, J^4 J^5, which are connected at their lower ends with the plates I and I′, respectively, so as to move said plates up and down when the shaft J is turned.

The plates I I′ and the pawls G G′ and H H′ are relatively so constructed and arranged that in moving said plates for the purpose of engaging one or the other of said pawls with one of the wheels, as E, one pawl, as G, will become entirely disengaged from the ratchet-wheel before the other pawl, as H, is allowed to become engaged therewith, so that there will be an intermediate point in the movement of each plate at which both of said pawls will be disengaged from the wheel, at which time the lever F may swing freely without causing any movement of the said wheel.

By placing the eccentrics J^2 J^3 in the position with relation to each other as above described, it is entirely obvious that when one of the eccentrics is at the lower limit of its throw, and the plate I or I′, connected therewith, is similarly at the lower limit of its motion, the other of said eccentrics will be at the middle of its throw, and the plate connected with said last-mentioned eccentric will be in its intermediate position, so as to hold both of the pawls moved thereby free from the ratchet-wheel upon which they operate. It follows that when the parts are in the position last described, and as shown in Figs. 3 and 4, one pawl, as G, will be engaged with its ratchet-wheel, as E, and the three pawls, H, G′, and H′, will be disengaged from the wheels E and E′, and if, when the parts are in this position, the hand-lever is oscillated the wheel E will be turned in a direction to advance the knee connected therewith and the other ratchet-wheel will remain unmoved. In the same manner, if one of the eccentrics is carried to the extreme upper limit of its throw, so as to bring the other eccentric at the middle of its stroke, one of the pawls H or H′ will be engaged with one of the wheels for turning the latter backward, and the other pawls will be free from the wheels.

The parts are so arranged, furthermore, that when both eccentrics are turned downwardly to an equal extent both of the pawls G G′ will engage their respective wheels, as shown in Figs. 1 and 2, and similarly, when both are turned upwardly, both of the said pawls G and G′ will be disengaged and the pawls H and H′ engaged.

It will be observed that when both pawls, as G and G′, are engaged with the ratchet-wheels the eccentrics and plates I I′ are not at the extreme lower limit of their movement, but will be slightly raised. In order, therefore, to allow both pawls to engage the wheels at once, as above stated, a sufficient amount of lost motion is permitted between the plates and the pawls to allow the said pawls to properly engage the ratchet-teeth both when the plates are at the lowermost limit of their movement and when both are slightly raised and are opposite each other, as illustrated in Fig. 1.

It follows from the above that when both pawls G G′ are engaged with the ratchet-wheels, so that the actuation of the lever F will carry the knees forward, if the shaft is turned one-half around both pawls G G′ will become disengaged and the pawls H H′ engaged, with the result of moving both knees backward. If, when both the pawls G G′ are engaged with the ratchet-wheels, the shaft is turned—say to the right—so as to carry one of the plates, as I′, Fig. 4, to the lowermost limit of its movement, and the other plate, as I, to an intermediate point in its stroke, one of the pawls, as G, will remain in engagement with its ratchet-wheel and the other pawl, as G′, will be disengaged so that when the lever is moved back and forth the wheel E′, engaged by the pawl G′, will be turned, while the other wheel will remain stationary. Similarly, if the shaft J is turned so as to carry one of the plates I or I′ to the uppermost limit of its movement, and the other of said plates at its intermediate point, one of the pawls H or H′ will be engaged with one of the wheels in such manner as to impart a backward rotation thereto when the lever is moved, while the other of said pawls will remain disengaged.

It follows from the above that by turning the shaft J to a desired position either by the hand applied to the handle J′ or to the rod J^2, and then giving an oscillatory motion to the lever F, the knees may be moved either backward or forward, together or separately, at the will of the operator.

K is a slotted guide-segment, which is preferably employed for guiding the lever F, and which is provided with stop devices for controlling the amplitude of the oscillatory movement of the said lever, so that the knees may be moved and the log fed forward a distance required to make a board of the desired thickness at one or more full strokes of the lever.

In Fig. 3 I have shown a pin, k, adapted for insertion in either one of a series of holes, k', as applied to limit the forward movement of the lever, while an adjustable stop formed by a set-screw, K′, inserted in the metal of the segment, is employed to limit the rearward

movement of said lever, said screw K′ being preferably provided with a jam-nut, k^2, and serving to give adjustment of the stroke for small or slight differences in the thickness of the boards being sawed.

In order to prevent any backward movement or yielding of the knees, as the latter are carried forward by the devices above described, I have provided, in connection with the ratchet-wheels E E′, two pawls, L L′, which are pivoted upon an adjacent stationary part of the carriage-frame in position to engage the peripheral teeth *e* of said wheels. To cause the release of said pawls L L′ from the ratchet-wheels when it is desired to turn the latter backward, automatically-acting means are herein provided as follows: The said pawls are provided, near their free ends, with upwardly-projecting parts L^2 L^3, having upon their upper ends arms *l l′*, extending toward the lever F, and at their parts remote from the lever with shoulders l^2 l^3, adapted for engagement with spring-detents M M′, adapted to sustain the pawls free from the wheels. The arms *l l′* are provided upon their under surfaces with inclined faces l^4 l^5, which are adapted to engage parts or surfaces I^4 I^5 upon the sliding plates I I′, said parts being so located relatively that when one of the plates I I′ is in its elevated position and the lever F is thrown backwardly toward the pawls one of the said arms *l l′* will be engaged by the surface I^4 or I^5 of the elevated plate, and the pawl thereby lifted until caught by the detent M or M′, while, on the contrary, when one of the plates I I′ is depressed the said surfaces I^4 or I^5 will pass beneath the arms *l* or *l′* without contact therewith, so that, except when the said plates are raised so as to disengage the pawls G G′ and allow the engagement of the pawls H H′ with the wheels, the said pawls L L′ will remain in engagement with the wheels, to prevent any backward rotation thereof. The several parts above referred to are so constructed, furthermore, that the pawls L L′ will not become released from the wheels E and E′ until the pawls H H′ are engaged therewith, so that when one of the pawls G G′ is disengaged from its ratchet-wheel to allow the other ratchet-wheel to be moved by the lever the disengaged ratchet-wheel will be held from backward movement under any strain that may be thrown upon the knee connected therewith tending to slide said knee backward.

In the particular construction herein illustrated, in which the plates I and I′ engage the pawls G G′ at points considerably distant from the free ends of said pawls, the said free ends of the pawls are carried a considerable distance by a relatively small movement in the plates, so that the pawls will become promptly disengaged from the ratchet-teeth at the beginning of the upward movement of the said plates I I′, and the said pawls L L′ will not be lifted out of engagement with the ratchet-wheels before the pawls G G′ are clear of the said wheels, even though the parts I^4 I^5 are arranged to engage and lift said pawls L L′ at the beginning of the upward movement of the plates.

It will of course be understood that the pawls L L′ may be lifted either by throwing the lever to the backward limit of its movement, and then rotating the shaft J so as to carry the plates I I′ upwardly, or by turning said shaft when the lever is at some other part of its stroke, and thereafter thrusting the lever backwardly, so as to carry the surfaces I^4 I^5 of the plates I I′ against the inclined surfaces l^4 l^5. The said inclined surfaces l^4 l^5 are shown in the drawings as terminating in shoulders l^6 l^7, adapted for engagement with the surfaces I^4 I^5 when the lever F is at the backward limit of its movement, and the plates I I′ are moved for lifting the pawls L L′ in the manner before described; but such construction is obviously not essential.

The detents M M′ are, as herein shown, sustained by attachment to the segmental guide K; but said detents may be movably supported in any desired manner, and may be provided with any suitably-arranged spring arranged to cause said detents to become automatically engaged with the pawls L L′ when the latter are lifted. In the particular form of the device herein illustrated said detents are made of a single piece of spring metal, made thin at their upper portions, *m m*, to allow the necessary yielding of their lower hooked ends. To allow of an accurate adjustment of the detents with relation to the pawls L L′, said detents are desirably provided with straight shanks *m′ m′*, inserted in suitable apertures in the segmental guide K and held therein by set-screws m^2 m^2.

In order to enable the detents M M′ to be disengaged from the pawls L L′, so as to allow the said pawls to again operate after being lifted, as above described, the plates I I′ are provided with parts or surfaces I^6 I^7, adapted to engage projections M^2 M^3 upon the said detents when the said plates are at the lower portion of their movement, so that when either or both of the pawls H H′ are released from the ratchet-wheels one or both of the pawls L L′ will be allowed to engage the ratchet wheel or wheels, so as to prevent backward movement of the latter.

The surfaces I^6 I^7 of the plates I I′, which engage the projections M^2 M^3, are preferably beveled or inclined, as shown, so that in case one of the plates is lowered at the time the lever F is at the rearmost limit of its movement, as illustrated in Fig. 5, the said inclined surface I^6 or I^7, acting upon one of the said projections, will thrust the detent backward, and thereby release the pawl supported thereby. It will of course be understood that in case a plate, I or I′, is depressed while the lever is being moved or is in the forward part of its stroke that when it is next thrust backward the surface I^6 or I^7 will strike the projection M^2 or M^3 and move the detent in the manner before described.

The surfaces I^4 I^5 and I^6 I^7 upon the plates I I′, by which the pawls L L′ and detents M M′ are moved, may be formed in any suitable way upon said plates. As herein shown, the middle portions of the parts of the plates at the rear surface of the lever F are cut away so as to leave suitably-located parts at the top and bottom of the plates, upon which said surfaces I^4 I^5 I^6 I^7 are formed.

In the particular construction illustrated, the segmental guide K is attached at its ends to and supported by a rectangular frame, N, which is bolted to the side of the head-block B, and is preferably provided with a bearing, *n*, for the shaft D, and with lugs or projections *n′ n′*, to which the pawls L L′ are pivoted.

In order to provide for readily bringing the knees into a position equally advanced after they have been moved one in advance of the other, by the use of the devices above described means are herein provided as follows: Upon the ends of the shaft D and sleeve D^3, exterior to the head-block B′, are attached two disks or wheels, O and O′, preferably of the same diameter, and between said disks is placed a crank-arm or loose disk, P, provided with a head, P′, preferably, but not necessarily, provided with a handle, P^2, by which it may be turned. In said head P′ are mounted two spring pins or catches, *p p′*, adapted to engage notches or recesses *o o′*, one formed in the disk O and the other in the disk O′. The edges or peripheral parts of the disks are made smooth or cylindric, and the said spring pins or catches are adapted to bear against and run or slide smoothly upon the said edges, except when engaged with the recesses *o o′*. The said recesses, furthermore, are so arranged relatively to each other that the pins *p p′* will both be engaged therewith when the shaft D and sleeve D^3 are in position for holding the knees equally advanced, and means are provided for separately holding the pins or catches *p p′* free from the recesses *o o′*. In the particular construction illustrated the pins *p p′* are made to slide in recesses in the head P′, and are thrown inwardly into position to engage the recesses *o o′* by spiral springs p^2 p^3, placed in said recesses, and surrounding rods or stems p^4 p^5, which form prolongations of the said pins, extending outwardly through the head P′. To the ends of said stems p^4 p^5 are pivotally connected cam-levers P^3 P^4, provided with cam-surfaces, which bear upon the surface of the head P′, and are so disposed relatively to the pivots connecting the levers with the stems p^4 p^5 that when the levers are turned in one direction the pins *p p′* will be held out of contact with the disks O and O′, and when turned in the opposite direction will rest against the said disks and will be free to enter the recesses *o o′*. These parts being constructed as above set forth, it is entirely obvious that if the knees are unequally advanced and one of the catches P or P′ is engaged with one of the recesses *o* or *o′* a movement of either knee tending to bring it opposite the other knee will turn the one or the other of the disks O or O′ in a direction to bring the recesses *o* and *o′* opposite each other, and that as soon as said recesses are opposite each other the disengaged pin will also become engaged with a recess in a disk, and said disks will be held from further movement. It is entirely obvious, also, that the same result will follow when the head P′ is connected with the recess of either of the disks, it making no difference whether the head is moved or not, inasmuch as both pins *p* and *p′* will become engaged and the disks locked from further relative movement as soon as the recesses *o* and *o′* therein are brought into position for the engagement of both pins therewith.

It follows from the above that the operation of bringing the knees into an equally-advanced position may be accomplished by the devices described by moving either knee either backward or forward, it being only necessary to move one knee in a direction to bring it opposite the other knee, when, at the moment of reaching the proper position, the disks will become automatically locked without attention from the operator, and any further movement of the actuating devices will cause both knees to move together.

In order to permit the separate movement of the knees after the disks O and O′ have been locked, as above set forth, one or the other of the spring pins or catches *p p′* is withdrawn from engagement with the disk by moving one of the cam-levers P^3 P^4. After the disks have been relatively moved, both pins may be again released and allowed to rest against the disk in readiness for again "evening up" the knees when desired.

The handle P^2 (shown as attached to the head P′) is for the purpose of enabling an attendant standing near the carriage to move either or both of the knees by engaging either one or both of the spring-catches *p p′* with one or both of the disks O O′, and then turning the handle in a direction to move the knee or knees, as desired.

I have herein shown, in Figs. 8 and 9, an adjustable block, Q, as applied to the segmental guide K in place of the pin *k* as a means of determining the throw of the lever F and the forward movement of the knees, so as to give boards or strips of greater or less thickness, as desired. Said block is held and guided by engagement with the segment K, as shown, and is provided with a swinging dog, Q′, having an inclined tooth or projection, *q*, adapted to engage either one of a series of teeth or notches, k^3, formed in the upper surface of the segment below the slotted portion thereof. The dog Q′ is provided with a handle, *q′*, whereby the dog may be raised from engagement with the teeth k^3 and the block Q moved to a desired position. In order to enable said block Q to be moved when desired by the sawyer, through the medium of the

lever F and rod J^2, means are herein shown, as follows:

Upon the forward or free end of the dog Q, and extending toward the lever F, is formed an arm, q^2, provided with a hook or shoulder, q^3, and upon one of the connecting or eccentric bars, as J^5, is placed a projecting arm, Q^2, having a shoulder or hook, q^4, adapted for engagement with the hook q^3 of the arm q^2. The arm Q^2 is so placed upon the bar J^5 that it will engage the arm q^2 when the eccentrics and sliding plates I I′ are in such position that all of the pawls are free from the wheels E E′, so that when the shaft J is in the proper position to free the several pawls the lever F may be swung into position to engage the arm Q^2 upon the eccentric bar with the arm q^2 of the dog Q, and the shaft J then turned so as to lift the said arm Q^2, and thereby lift the free end of the dog out of engagement with the teeth k^3. By moving the lever F the block Q may be then slid bodily to the required position, and the dog then allowed to re-engage the teeth k^3 by a reverse movement of the shaft.

It will of course be understood that when the devices last described are employed the eccentrics and plates I I′ will be given a sufficient throw to enable the movement of the arm Q^2, for lifting the dog Q in the manner described, to take place, while the several pawls are disengaged and without throwing either of said pawls into operative engagement with the wheels; and, furthermore, the parts will be so arranged that when the plates I I′ are elevated sufficiently to cause the pawls H H′ to engage the wheels the arm Q^2 will come into position to pass over the arm q^2 of the dog Q, so as to leave the said dog undisturbed at such time.

The shaft D is herein shown as provided with a longitudinal groove, *d*, and the pinion D^2 is made to slide longitudinally upon the shaft and provided with a spline engaging the groove, whereby the head-block B′ may be moved bodily upon the carriage, as may be desired in operating upon larger or shorter logs without trouble in shifting the pinion upon the shaft.

I claim as my invention—

1. The combination, with the knees of a saw-mill carriage, of two or more independently-rotating ratchet-wheels having separate operative connection with the said knees, each of said ratchet-wheels being provided with two sets of ratchet-teeth oppositely directed with relation to each other, an oscillating lever provided with two sets of pawls for each of said ratchet-wheels, and means connected with and actuating said several pawls, substantially as described.

2. The combination, with the knees of a saw-mill carriage, of two or more independently-rotating ratchet-wheels having separate operative connection with said knees, each of said ratchet-wheels being provided with two sets of teeth oppositely directed with relation to each other, an oscillating lever provided with two sets of pawls for each of said wheels, pawls sustained upon a stationary part of the carriage and engaged with the ratchet-wheels, and means connected with and actuating the said several pawls, substantially as described.

3. The combination, with the knees of a saw-mill carriage, of two or more independently-rotating ratchet-wheels having separate operative connection with the said knees, an oscillating lever provided with pawls engaging said ratchet-wheels, a shaft mounted upon said lever and provided with two or more eccentrics, and means connecting said eccentrics with the said pawls, whereby either, any, or all of the latter may be engaged with or disengaged from said ratchet-wheels by a rotative movement of the shaft, substantially as described.

4. The combination, with the knees of a saw-mill carriage, of two or more independently-rotating ratchet-wheels having separate operative connection with the said knees, an oscillating lever provided with pawls engaging said ratchet-wheels, a rotating shaft mounted upon said lever and provided with eccentrics, and separately sliding plates upon the said lever connected severally with the said pawls and with the said eccentrics, whereby either, any, or all of the pawls may be engaged with or disengaged from the ratchet-wheels by a rotative movement of the said shaft, substantially as described.

5. The combination, with the sliding knees of a saw-mill carriage, of two or more independently-rotating ratchet-wheels having separate operative connection with said knees, each of said wheels being provided with two sets of ratchet-teeth oppositely directed with relation to each other, an oscillating lever provided with two sets of pawls engaging each of said wheels, a rotating shaft mounted upon said lever and provided with two or more eccentrics, two or more sliding plates mounted upon the lever and each engaging the pawls belonging to the several wheels, said plates being constructed to hold the pawl engaging one set of ratchet-teeth upon each wheel disengaged at the time the other pawl is engaged with the wheel, and means connecting said eccentric with the said sliding plates, substantially as described.

6. The combination, with the knees of a saw-mill carriage, of two or more independently-rotating ratchet-wheels having separate operative connection with said knees, each of said wheels being provided with two sets of ratchet-teeth oppositely directed with relation to each other, pawls G G′ upon the lever operating to turn the wheels in a direction to carry the knees forward, other pawls, H H′, also mounted upon the said lever and provided with springs operating to throw said pawls H H′ into engagement with the ratchet-teeth by which the wheels are turned for carrying the knees backwardly, sliding plates I I′, having parts engaging the said pawls G G′

for lifting the latter from engagement with the wheel, and with other parts engaging the pawls H H′ for holding the latter free from the wheels, a shaft mounted upon the lever and provided with eccentrics, and suitable eccentric-rods connecting said eccentrics with said sliding plates, substantially as described.

7. The combination, with the knees of a saw-mill carriage, of two or more independently-rotating ratchet-wheels having separate operative connection with said knees and each provided with two separate sets of ratchet-teeth, an oscillating lever provided with pawls G G′ H H′, engaging the ratchet-teeth of the several wheels, pawls L L′, mounted upon the machine-frame and engaging the said wheels to prevent the latter from turning backward, said pawls being provided with inclined or cam surfaces, as l^4 l^5, spring-detents M M′, engaging said pawls L L′ for holding the latter disengaged from the ratchet-wheels, sliding plates I upon the lever provided with parts engaging the said pawls G G′ and H H′, and also with parts engaging the cam-surface l^4 l^5, and the detents M M′, substantially as described.

8. The combination, with the knees of a saw-mill carriage, of two or more independently-rotating ratchet-wheels having separate operative connection with said knees and each provided with two sets of ratchet-teeth, an oscillating lever provided with two sets of pawls, G G′ and H H′, engaging each of said set of wheels, pawls L L′ upon the carriage-frame engaging said wheels, said pawls being provided with inclined or cam surfaces l^4 l^5, spring-detents M M′, engaging said pawls L L′ for holding the latter free from the ratchet-wheels, independently-moving sliding plates I I′ upon said lever, engaging and actuating said pawls G G′ H H′, and provided with parts engaging the cam-surfaces l^4 l^5, and with inclined or oblique surfaces I^6 I^7, engaging a part or projection of the spring-detents M M′, and means for actuating said plates I I′, substantially as described.

9. The combination, with the sliding knees of a saw-mill carriage, of a longitudinal shaft having operative connection with one of said knees, a sleeve upon the shaft connected with and operating the other of said knees, ratchet-wheels fixed to the said shaft and sleeve, an oscillating lever provided with pawls engaging said ratchet-wheels, and means upon the lever, connected with the pawls, whereby the latter may be engaged with and disengaged from the said ratchet-wheels at will, substantially as described.

10. The combination, with the sliding knees of a saw-mill carriage, of a rotating shaft having operative connection with one of said knees, a sleeve mounted on the shaft and actuating the other of said knees, ratchet-wheels attached, respectively, to the said shaft and sleeve, and means for turning said ratchet-wheels either separately or together, disks, as O O′, fixed to the said shaft and sleeve, said disks being each provided with a single notch or recess in its periphery, and a freely-revolving disk or arm, P, provided with spring-catches p p', adapted for engagement with the said notches, substantially as described.

11. The combination, with the sliding knees of a saw-mill carriage, a rotating shaft having operative connection with one of said knees, a sleeve mounted on the shaft actuating the other of said knees, ratchet-wheels attached, respectively, to the said shaft and sleeve, and means for turning said ratchet-wheels either separately or together, of disks, as O O′, provided with notches or recesses o o', a disk or arm, P, sliding catches p p', mounted in the arm P and adapted to engage the said recesses o o', and cam-levers P^2 P^3, engaging the said springs catches for holding the latter free from the said recesses, substantially as described.

12. The combination, with a ratchet-wheel and oscillating lever for actuating the knees of a saw-mill carriage, of a segmental guide, K, for the said lever, provided with notches k^3 and an adjustable block, Q, for limiting the oscillatory movement of the lever, said block being constructed to slide upon the said guide and being provided with a pivoted dog, Q′, adapted to engage said notches, substantially as described.

13. The combination, with the ratchet-wheels E E′, an oscillating lever provided with pawls engaging said ratchet-wheels, and a segmental guide or support, K, provided with notches k^3, and means upon the lever for moving said pawls, comprising longitudinally-movable bars, as J^3 J^4, of a stop for limiting the movement of the said lever, consisting of a sliding block, Q, provided with a pivoted dog, Q′, adapted to engage one of the said notches k^3, said dog being provided with a hooked arm, q^2, and an arm, Q^2, upon one of said parts J^3 J^4, adapted to engage the arm q^2 upon the dog for releasing said dog and moving the block, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

WARREN L. RAYNES.

Witnesses:
D. C. JOHNSON,
W. L. MOREY.