(No Model.)

3 Sheets—Sheet 1.

C. ESPLIN.

SAW MILL SET WORKS.

No. 344,366. Patented June 29, 1886.

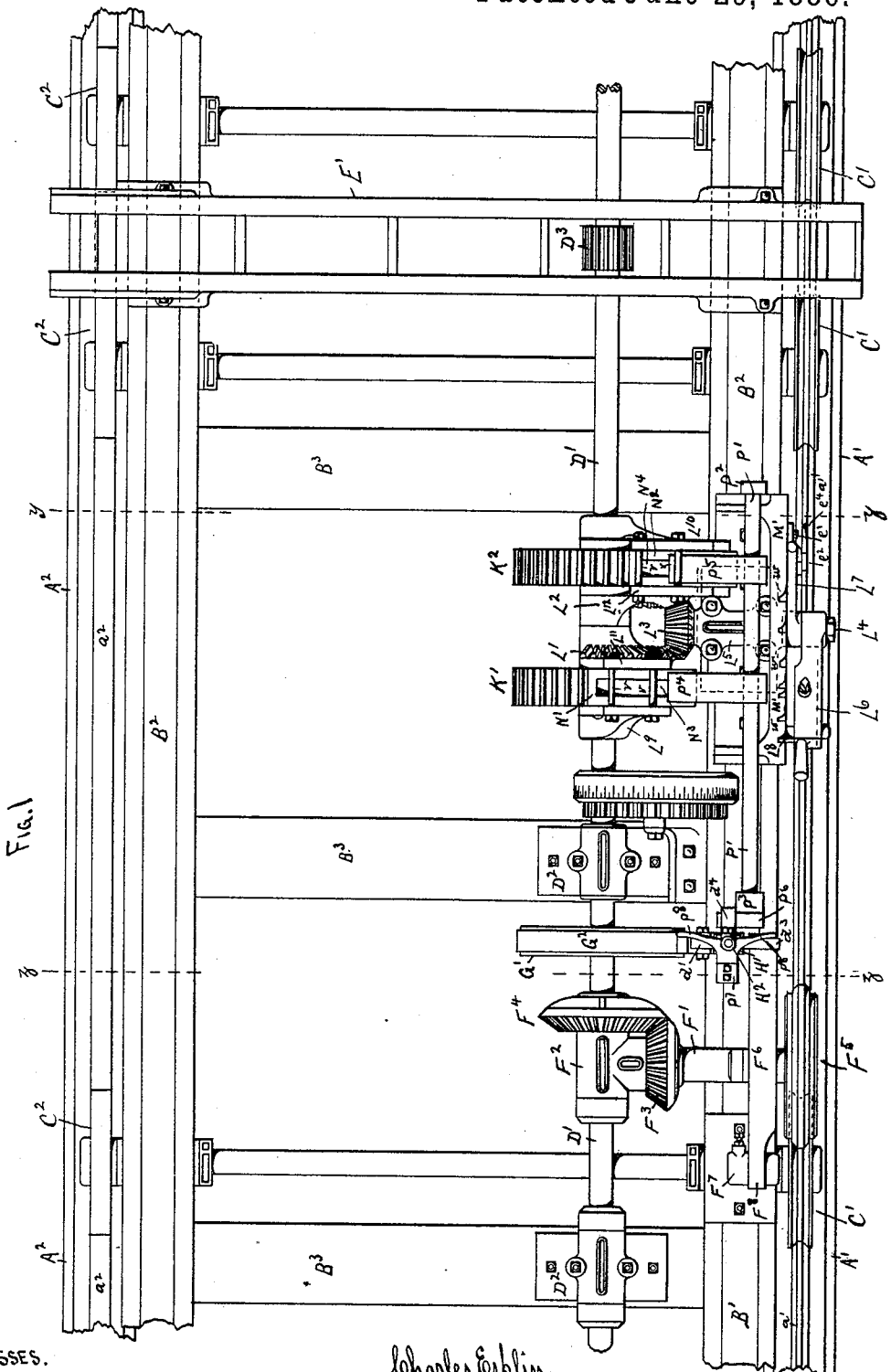

Fig. 1.

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(No Model.) 3 Sheets—Sheet 2.

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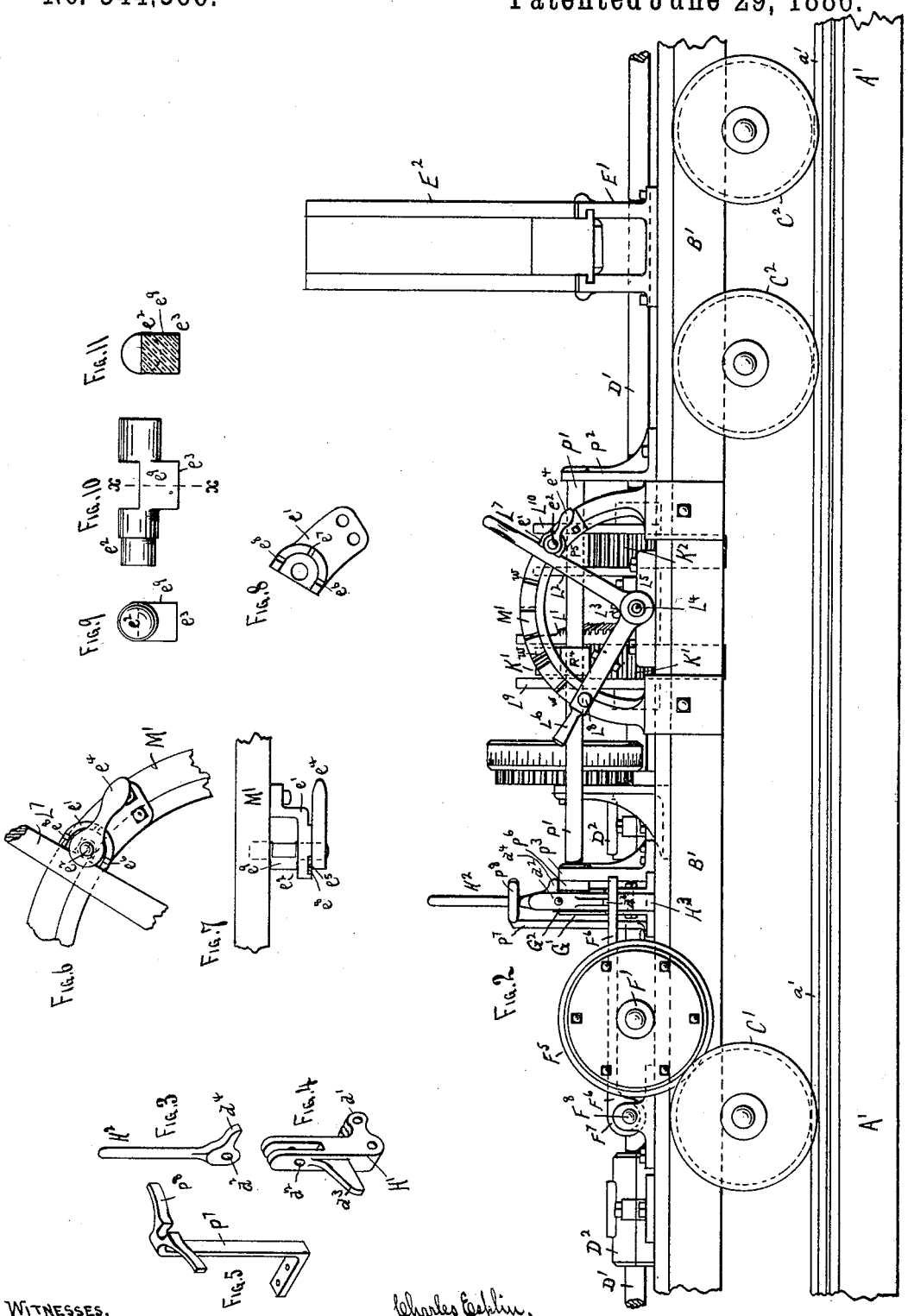

Fig. 2.

Fig. 11. Fig. 10. Fig. 9. Fig. 8.

Fig. 6. Fig. 7.

Fig. 3. Fig. 4. Fig. 5.

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(No Model.)

3 Sheets—Sheet 3.

C. ESPLIN.

SAW MILL SET WORKS.

No. 344,366. Patented June 29, 1886.

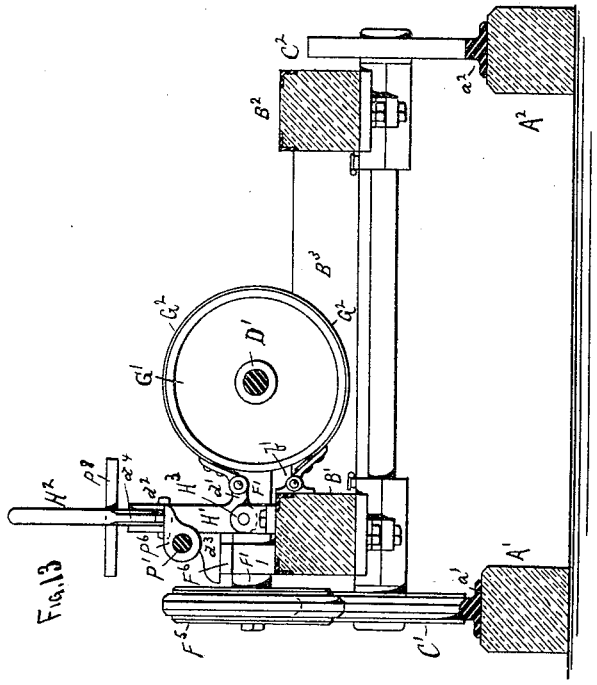

Fig. 13

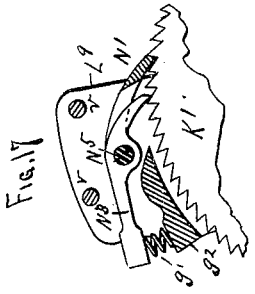

Fig. 17

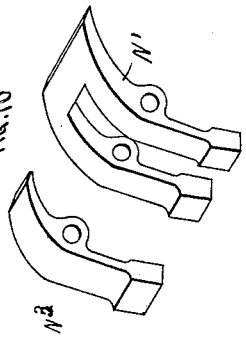

Fig. 16

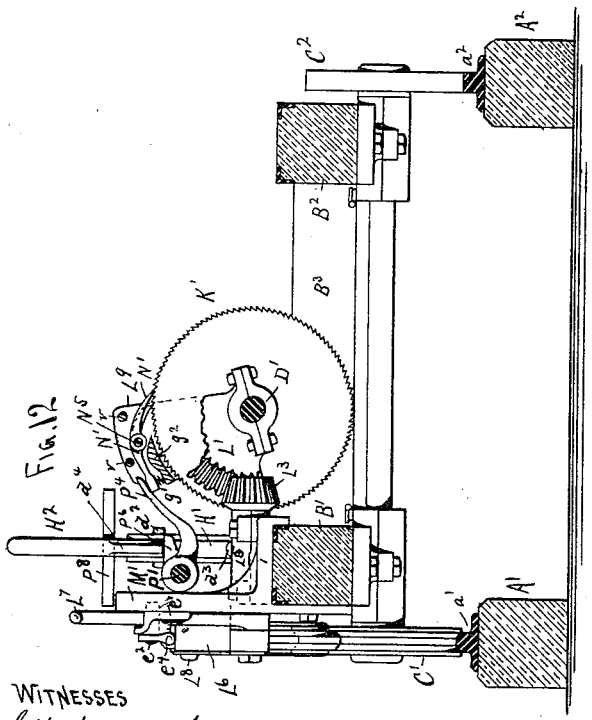

Fig. 12

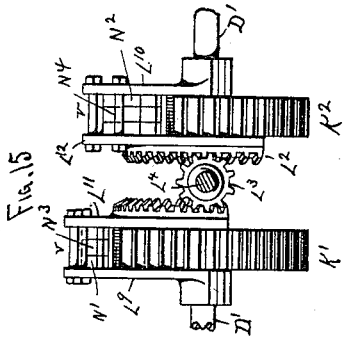

Fig. 15

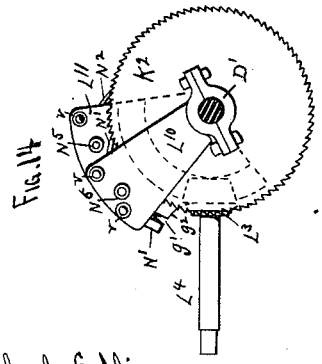

Fig. 14

WITNESSES

C. M. Woodward

Louis Fesser Jr

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Attys.

UNITED STATES PATENT OFFICE.

CHARLES ESPLIN, OF MINNEAPOLIS, MINNESOTA.

SAW-MILL SET-WORKS.

SPECIFICATION forming part of Letters Patent No. 344,366, dated June 29, 1886.

Application filed October 19, 1885. Serial No. 180,215. (No model.)

To all whom it may concern:

Be it known that I, CHARLES ESPLIN, a subject of the Queen of Great Britain and Ireland, who have declared my intention of becoming a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Saw-Mill Set-Works, of which the following is a specification.

This invention relates to circular-saw mills; and it consists in the construction, combination, and arrangement of parts, as hereinafter shown and described, and then sought to be specifically defined by the claims.

Figure 1 is a plan view, and Fig. 2 is a rear view, of a portion of the carriage of a saw-mill, showing my improved set-works arranged thereon. Figs. 3 and 4 are detached details, in perspective, of the compound lever by which the brake, the receding, and the pawl-lifting mechanisms are operated. Fig. 5 is a perspective view of the lever guide and stop detached. Figs. 6, 7, and 8 are enlarged details of the stop-lever-adjusting mechanism. Fig. 9 is an end view, and Fig. 10 is a side view enlargement, of the stop-lever-adjusting shaft detached. Fig. 11 is a cross-section on the line *x x* of Fig. 10. Fig. 12 is a cross-sectional view on the line *y y* of Fig. 1, and Fig. 13 a cross-sectional view on the line *z z* of Fig. 1. Fig. 14 is a side view of the ratchet-disks and their operating-pawls and frames detached. Fig. 15 is a front view of the parts shown in Fig. 14. Fig. 16 represents in perspective one of the double pawls enlarged and detached. Fig. 17 is an enlarged sectional detail of one of the pawls and a portion of one of the ratchet-disks, illustrating more fully the operation of the pawls.

A′ A^2 represent the stringers on which the rails a' a^2, which support the carriage, are set.

B′ B^2 represent the main side stringers, and B^3 the cross-timbers of the carriage, which are adapted to run upon the rails a' a^2 by the usual bearing-wheels, C′ C^2, journaled across beneath the carriage. The rail a' is V-shaped on its upper surface, and the wheels C′ have correspondingly-V-shaped grooves in their rims to fit over this rail, so that the carriage will not run off from the track.

D′ represents the "set-shaft," which operates the knees of the head-blocks, and is mounted upon the carriage by bearings D^2, and running through the bases E′ of the head-blocks, which are secured across the carriage at suitable intervals. Only one of these head-block bases E′ and its sliding knee E^2 are shown in the drawings; but, of course, it will be understood that any number may be used. Within each of the head-block bases the shaft D′ is provided with a gear, D^3, adapted to engage with a rack upon the lower side of the knee E^2, each of the latter adapted to slide in its respective base in the ordinary manner, so that the revolution of the shaft D′ will move the knees backward and forward in the bases to "set" the knees with relation to the bases and the saw.

F′ is a short shaft at right angles to the main shaft D′, and with its inner end journaled in a collar, F^2, encircling the shaft D′, and provided on its inner end, next to the collar F^2, with a bevel-pinion, F^3, adapted to engage with a bevel-gear, F^4, on the shaft D′, so that the revolution of the shaft F′ may be communicated to the shaft D′. The outer end of this short shaft F′ is provided with a friction-wheel, F^5, having its edge V-shaped and adapted to engage with the correspondingly-V-shaped groove in the rim of one of the wheels C′, which support the carriage. Just in the rear of friction-wheel F^5 the shaft F′ is journaled in or attached to a lever, F^6, one end of this lever being pivoted in a standard, F^7, while the other end is free to be moved upward and downward. By this means the movement of the lever F^6 downward will throw the the friction-wheel F^5 into contact with the wheel C′, so that the motion of the wheel C′ may be communicated to shafts F′ D′, and connected with or disconnected therefrom at pleasure, to recede the head-blocks, as hereinafter shown.

The bearing by which the lever F^6 is connected to the standard F^7 is set eccentrically to the lever, as shown at F^8 in Figs. 1 and 2, so that by revolving the eccentric the lever and its attached friction-wheel F^5 may be adjusted to the grooved wheel C′, to regulate the tension and take up the wear of the wheels.

G′ is a flat-rimmed wheel encircled by a band, G^2, said band being pivoted by one end, b', to the stringer B′ of the carriage, while the

other end of the band is pivoted to a foot, d', projecting from a lever, H', the latter being pivoted by its lower end in a standard, H^3, on the stringer B'. By this means the forcing of the lever H' inward toward the wheel G' will cause the foot d' to draw the band G^2 around the wheel G', and thus compress it by the band, and form a brake to the set-shaft D'. This lever H' is made in two parts, the lower part, H', being pivoted in the standard H^3, and having the foot d' attached to it at one side, while the upper part, H^2, is pivoted at d^2 in the lower part, H', and at right angles thereto. By this arrangement the upper part, H^2, of the lever may be bent over at an angle to the lower part, H', or in a direction parallel with the length of the carriage, without affecting the lower part, H'; but when bent in a direction at right angles to the carriage it will carry the lower part, H', with it, as hereinafter more fully set forth.

Projecting from the face of the lower section, H', of the lever, opposite the foot d', is a lug or stop, d^3, which projects across the free end the lever F^6, so that if the lever H' H^2 is pulled outward it will compress the lever F^6 by the compression of the lug d^3 thereon. This outward movement of the lever H' H^2 also, of course, raises the foot d' on the opposite side of the lever, and loosens the band G^2 around the wheel G'; but this does no harm, and produces no effect. Then, if the lever H' H^2 be pushed inward, the brake-band G^2 is set around the wheel G', as before described, this action of course raising the lug d^2 upward, away from the lever F^6, but without producing any effect thereon. Thus, by pushing the lever H' H^2 inward, the brake is set, and by pulling it outward the friction-wheel F^5 is thrown into gear with one of the wheels C' of the carriage, the lever being inoperative with relation to the brake while it is operative with relation to the friction-wheel, and vice versa.

Fixed by keys or other means to the shaft D', a short distance apart, are two large ratchet wheels or disks, K' K^2, and between these two disks are mounted loosely upon the shaft two beveled geared segments, L' L^2, with their teeth projecting inward, and both adapted to engage with one common bevel-pinion L^3, the latter mounted upon a short shaft, L^4, in a suitable bearing, L^5, at right angles to the shaft D', said bearing being attached to the top of the carriage, as shown. On the outer end of this short shaft L^4 are two levers, L^6 L^7, the former loose upon and the latter fixed to said shaft. On the shaft D', outside the ratchet-wheels K' K^2, are journaled loosely two plates, L^9 L^{10}, with their upper ends projecting beyond the ratchet-wheels and corresponding in shape to two projecting plates, L^{11} L^{12}, attached to or formed in one piece with the geared segments L' L^2, the two sets of plates being firmly bolted together by bolts r. Between each pair of these plates L^{11} L^{12}, above each of the ratchet-wheels, are pivoted dogs or pawls N' N^2 N^3 N^4, adapted to engage with the teeth of the ratchet-wheels. The rear ends of the pawls are held upward, and their forward ends held downward, in contact with the ratchet-teeth, by springs g', supported in blocks g^2 on the plates L^{11} L^{12}. Each of these pawls is formed double, or with an outer pawl, N' or N^2, and an inner pawl, N^3 or N^4, the inner pawls being shorter than the outer pawls, but each pair pivoted to one common cross-rod, N^5 or N^6, connecting the plates L^{11} L' and L^{12} L^2, respectively. In Figs. 16 and 17 is shown a set of these pawls enlarged.

M' is a semicircular metal frame attached to the stringer B' of the carriage, the center of the radius of the segment being the center of the shaft L^4. Attached to this segment is a small bracket, e', in which is pivoted a short shaft, e^2, the inner end of the shaft e^2 projecting through and journaled into the segment M'. This shaft e^2 will be formed, as shown in Figs. 9, 10, and 11, with a projection, e^3, on one side of that part of the shaft which is between the bracket e' and the segment M', and with the side of the shaft opposite this projection e^3 cut away for one-half the thickness of the shaft. The shaft e^2 will usually be formed one and one-half ($1\frac{1}{2}$) inch in diameter, and the cut-away portion will be one-half ($\frac{1}{2}$) an inch deep, and the projection e^3 one-half ($\frac{1}{2}$) an inch thick, so that the projection and the part between the projection and the bottom of the cut-away section will be just one and one half ($1\frac{1}{2}$) inch thick, or, in other words, this shaft will be formed with a central section one and one-half ($1\frac{1}{2}$) inch square and eccentric to the main part of the shaft, being one-half ($\frac{1}{2}$) inch off the center. I do not wish to be confined to these dimensions, but generally they will be found the most convenient to use, these proportions being used on the principle that one-half ($\frac{1}{2}$) inch of movement of the lever L' on the segment M' will cause the knees to be moved outward one-sixteenth of one inch. On the outer end of this shaft e^2, outside the bracket e', is a short lever-arm, e^4, having a small lug or point, e^5, projecting inward toward the bracket e', and adapted to fit into notches e^6 e^7 e^8 in the outer face of the bracket. This arm e^4 will be set at right angles to the lug or projection e^3 on the shaft e^2, so that when set in the position shown in the drawings its projection e^5 will rest in the center notch, e^7, and hold the flat surface e^9 against the lever L'. Then, if the small arm e^4 be turned upward until its projection e^5 rests in the notch e^8, the cut-away section will be turned toward the lever L' and allow the latter to drop down one-half ($\frac{1}{2}$) inch. Then, if the arm e^4 be turned downward until its projection e^5 catches in the notch e^6, the projection e^3 on the shaft e^2 will be turned toward the lever L' and hold it upward away from the shaft one-half ($\frac{1}{2}$) inch.

The inner pawls, N^3 and N^4, are shorter than their respective outer pawls, N' N^2, as shown in Fig. 17, and rest only half-way down the incline

of the teeth, so that the pawls need only be moved one-half the length of one of the ratchet-teeth to cause them to engage therewith; hence only one-half the number of the ratchet-teeth are required that would be required were the pawls formed singly.

The lever L^6 has a spring-catch, L^8, and the segment M′ has a series of notches, *w*, in its face, into which the spring-catch is adapted to engage. The notches *w* will be placed in the segment to correspond to the thickness of the lumber to be sawed, each notch representing a dimension of lumber. These notches may be varied to any extent to cut any size of lumber; but for the purpose of illustration I have shown in the drawings, in Figs. 1 and 2, a set of notches adapted to cause the lever L^7 to move the knees outward the distance of one-half ($\frac{1}{2}$) inch, three fourths ($\frac{3}{4}$) of an inch, one (1) inch, one and one-fourth ($1\frac{1}{4}$) inch, one and one-half ($1\frac{1}{2}$) inch, one and three-fourths, ($1\frac{3}{4}$,) and three (3) inches.

It will be seen that the moving of the lever L^7 from side to side will, through the pinion L^9 and geared segments L′ L^2, cause the latter to be oscillated alternately around the "set-shaft" D′ and ratchet-disks, and by means of the pawls N′ N^2 N^3 N^4 this oscillation will communicate motion to the set-shaft, the shaft being moved forward by the action of one set of pawls when the lever L^7 is moved in one direction, and moved forward by the action of the other set of pawls when the lever is moved in the opposite direction. Thus the lever L^7 is double-acting or operative during both its forward and backward with strokes. Thus if the stop-lever L^6 be set with its spring-catch L^8 in the notch *w* nearest to the "home" stop-shaft e^2, and the lever L^7 moved over until it strikes the stop-lever L^6, and then back again until it strikes the stop e^2, the knees will be moved outward one-half ($\frac{1}{2}$) an inch, and thus set the log or timber being sawed so that a board one-half ($\frac{1}{2}$) an inch thick will be sawed off from it. Then, if the stop-lever be set to any of the other notches *w*, the lumber will be cut to a thickness corresponding therewith, as hereinbefore shown.

P′ is a horizontal shaft journaled in standards P^2 P^3 on the carriage, and provided with arms P^4 P^5, one of which projects inward and rests upon the rear end of the double pawl N′ N^3, while the other one, P^5, projects inward in a similar manner and rests upon the rear ends of the double pawl N^2 N^4. The opposite end of the shaft P′ from the arms P^4 P^5 ends just in front of the lever H′ H^2, as shown, and is provided on that end with a small cam or arm, P^6, upon which a projection, d^4, on the upper section, H^3, of the lever H′ H^2, rests when the latter is upright, as shown in Figs. 2 and 3.

As before stated, the compound lever is formed in two sections, H′ H^2, the upper section, H^2, being pivoted into the lower section at right angles to the axis of the lower section. By this means the upper section, H^2, may be bent over at right angles to the axis of the lower section, H′, without affecting the lower section, while at the same time, by the manner of its connection between the two parts of the lower section, H′, it is a fixture in the lower section when moved in a line parallel with the movement of the lower section, so that the two sections will be moved together when the brake is to be set or the receder to be thrown into gear.

The bending of the upper section, H^2, of the compound lever will cause the lug d^4 to compress the arm P^6, oscillate the shaft P′, and thus cause the arms P^4 P^5 to force down the rear ends of the pawls N′ N^2 N^3 N^4 and disconnect them from the teeth of the ratchet-wheels K′ K^2. By this simple means the pawls may be disconnected from the ratchet-wheels by the same lever that sets the brake and operates the friction-receding mechanism, and without affecting either the receder or the brake.

P^7 is a standard attached to the stringer B′ of the carriage, and having a forked projecting upper part or stop, P^8, partially embracing the rear of the upper section, H^2, of the compound lever. The upper section, H^2, of the compound lever, when in an upright position, as shown in the drawings, will rest with its rear sides within the recess in the center of this forked stop P^8 of the standard P^7, as shown, and then when the lever H′ H^2 is pushed inward to set the brake or pulled outward to set the receder the stop P^8 will force the operator to move the section H^2 sidewise toward the arms P^4 P^5, and thus release the pawls N′ N^2 N^3 N^4. By this arrangement the pawls may be released by bending the upper section, H^2, of the compound lever to one side, (as the presence of the forked stop P^8 does not interfere with this motion of the lever;) but in no case can the brake or the receder be set in operation without first lifting the pawls by the action of the stop P^8. The teeth of the ratchet-wheel K′ will be set to point in the same direction as the teeth of the wheel K^2, and the pawls will be similarly set to correspond therewith. If it is required to cut lumber one-sixteenth of an inch less in thickness than the notches *w* are set for, then the lever-arm e^4 is set so that the projection e^3 on the shaft e^2 will prevent the extreme throw of the lever L^7 or stop it one-half ($\frac{1}{2}$) an inch short of its full stroke, so that it will move the knees one-sixteenth of an inch less than with a full stroke. Then, if it is desired to cut lumber one-sixteenth of an inch greater in thickness, the shaft e^2 is turned until the lever L^7 will drop into its cut-out portion, which will increase the limit of its stroke one-half ($\frac{1}{2}$) an inch and cause the knees to be moved one-sixteenth of an inch farther outward.

The canting of logs against the knees when first placing them upon the carriage or in canting partially-sawed logs on the carriage forces the knees backward and exerts a very heavy force against them and endangers the pawls N′ N^2 N^3 N^4 by forcing the ratchet-disks

K′ K² backward against them; but with my attachments, by simply forcing the upper section, H², of the compound lever inward, the lug d^4 oscillates the shaft P′ and lifts the pawls from contact with the ratchet-disks, and at the same time sets the brake G′ G² upon the shaft D′. The brake is not intended to act with a great degree of force upon the shaft, but merely to hold it relatively firm, so that when the logs or the timber is canted against the knees the brake will offer some resistance and prevent the knees from being forced back too readily or thrown too far backward. Generally the brake will be sufficiently strong to hold the knees against any pressure that may be brought to bear against them, but should any extra pressure occur the knees will give and not cause any breakage of any of the parts.

After the logs are cut then the lever H′ H² is thrown outward and the friction-wheel F⁵ thrown into contact with the bearing-wheel C′, so that the motion of this wheel when the carriage is being run backward to receive a fresh log will be utilized to revolve the set-shaft D′ backward, and thus recede the head-blocks during the time the carriage is making its return-trip. At this point will be noticed the importance of the stop P⁸, as, unless the pawls N′ N² N³ N⁴ are lifted before the friction-wheels C′ F⁴ are thrown into gear, (as the set-shaft could not be turned by the receder,) the pawls or ratchets would be broken; but by the use of the trip the pawls will be lifted before the receder is thrown into gear and held up from contact with the ratchets so long as the receder is in operation.

Having thus described my invention, what I claim as new is—

1. In a saw-mill, a carriage mounted by bearing-wheels upon rails and adapted to be moved backward and forward past the saw, and carrying the head-blocks D D and set-shaft D′, said set-shaft being arranged to move said head-blocks by its revolution, ratchet-toothed disks K′ K² fast upon said set-shaft, and bevel-gear segments L′ L², loose upon said set-shaft and provided with pawls adapted to engage with the teeth of said ratchet-disks, and both of said segments adapted to be oscillated by one common pinion, L³, whereby said head-blocks may be set outward toward the saw by both the right and left hand oscillation of said pinion, substantially as set forth.

2. In a saw-mill, a carriage mounted by bearing-wheels upon rails and adapted to be moved backward and forward past the saw, and carrying the head-blocks D D and set-shaft D′, said set-shaft being arranged to move said head-blocks by its revolution, in combination with ratchet-toothed disks K′ K², fast upon said set-shaft, bevel-gear segments L′ L², loose upon said set-shaft between said ratchet disks, and having plates L¹¹ L¹², plates L⁹ L¹⁰, loose upon said shaft on the opposite sides of said ratchet-disks from said segments, pawls N′ N² N³ N⁴, pivoted between said plates L¹¹ L¹² and L⁹ L¹⁰, respectively, bevel-pinions L³ upon shaft L⁴, and adapted to engage with both of said segments, segmental guide M′, lever L⁷, fast upon said shaft L³, outside of said segmental guide, and stop-lever L⁶, loose upon said shaft L⁴, and adapted to be attached to said segmental guide, substantially as and for the purpose set forth.

3. In a saw-mill, a carriage mounted by bearing-wheels upon rails and adapted to be moved backward and forward past the saw, and carrying the head-blocks D D and set-shaft D′, said set-shaft being arranged to move said head-blocks by its revolution, ratchet-toothed disks K′ K², fast upon said set-shaft, bevel-gear segments L′ L², loose upon said set-shaft and provided with pawls adapted to engage with the teeth of said ratchet-disks, pinion L³, mounted upon shaft L⁴, and adapted to oscillate both of said segments by its revolution, segmental guide M′, lever L⁷, fast upon said shaft L⁴, and adjustable stop-shaft e^2, attached to said segmental guide and provided with projecting portion e^3 and correspondingly-sunken portion, whereby the said lever may be adjusted to set said head-blocks, substantially as set forth.

4. In a saw-mill, a carriage mounted by bearing-wheels upon rails and adapted to be moved backward and forward past the saw, and carrying the head-blocks D D and set-shaft D′, said set-shaft being arranged to move said head-blocks by its revolution, ratchet-toothed disks K′ K², fast upon said set-shaft, bevel-gear segments L′ L², loose upon said shaft, and provided with pawls adapted to engage with the teeth of said ratchet-disks, and both of said segments adapted to be oscillated by one common pinion, L³, shaft P′, carrying trips P⁴ P⁵ on one end, adapted to rest by their outer ends upon the rear ends of said pawls, and having lever-arm P⁶ on its opposite end, and pivoted lever H′ H², having foot d^4, adapted to move said lever P⁶ and oscillate said shaft P′, whereby said pawls may all be released from said ratchet-disks at the same time, substantially as set forth.

5. In a saw-mill, a carriage mounted by bearing-wheels upon rails and adapted to be moved backward and forward past the saw, and carrying the head-blocks D D and set-shaft D′, said set-shaft being arranged to move said head-blocks by its revolution, ratchet-toothed disks K′ K², fast upon said set-shaft, bevel-gear segments L′ L², loose upon said set-shaft, and provided with pawls adapted to engage with the teeth of said ratchet-disks, and both of said segments adapted to be oscillated by one common pinion, L³, brake-wheel G′, fast to said set-shaft and provided with brake-strap G², adapted to be operated by pivoted compound lever H′ H², shaft P′, carrying trips P⁴ P⁵ on one end, adapted to rest upon the rear ends of said pawls, and having a lever-arm, P⁶, on its opposite end, and foot d^4 on said lever H′ H², adapted to move said lever-arm and oscillate said shaft P′, whereby said pawls may all

be released and the brake applied to the set-shaft at the same time.

6. In a saw-mill, a carriage mounted by bearing-wheels upon rails and adapted to be moved backward and forward past the saw, and carrying the head-blocks D D and set-shaft D′, said set-shaft being arranged to move said head-blocks by its revolution, bevel-gear F^4, fast upon said shaft, bevel-gear F^3, mounted upon short shaft F′ and adapted to engage with said bevel-gear F^4, friction-wheel F^5 upon said shaft F′ and adapted to engage one of said bearing-wheels C′, pivoted lever F^6, supporting said shaft, and pivoted compound lever H′ H^2, having foot d^3, adapted to rest across said lever F^6, whereby the oscillating of said compound lever will depress said friction-wheel supporting-lever, substantially as set forth.

7. In a saw-mill, a carriage mounted by bearing-wheels upon rails and adapted to be moved backward and forward past the saw, and carrying the head-blocks D D and set-shaft D′, said set-shaft being arranged to move said head-blocks by its revolution, bevel-gear F^4, fast upon said shaft, bevel-gear F^3, mounted upon short shaft F′ and adapted to engage with said bevel-gear F^4, friction-wheel F^5 upon said shaft F′ and adapted to engage one of said bearing-wheels C′, pivoted lever F^6, supporting said shaft F′, pivoted compound lever H′ H^2, having foot d^3, adapted to rest across said lever F^6, shaft P′, carrying trips P^4 P^5 on one end, adapted to rest by their outer ends upon the rear ends of pawls N′ N^2 N^3 N^4, and having lever-arm P^6 on its opposite end, and foot d^4 upon said compound lever H′ H^2, adapted to rest upon said lever-arm, whereby all of said pawls may be released from their ratchets and the receding mechanism set in operation at the same time, substantially as set forth.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

CHAS. ESPLIN.

Witnesses:
JOSEPH GARBETT,
C. M. LINDMAN.