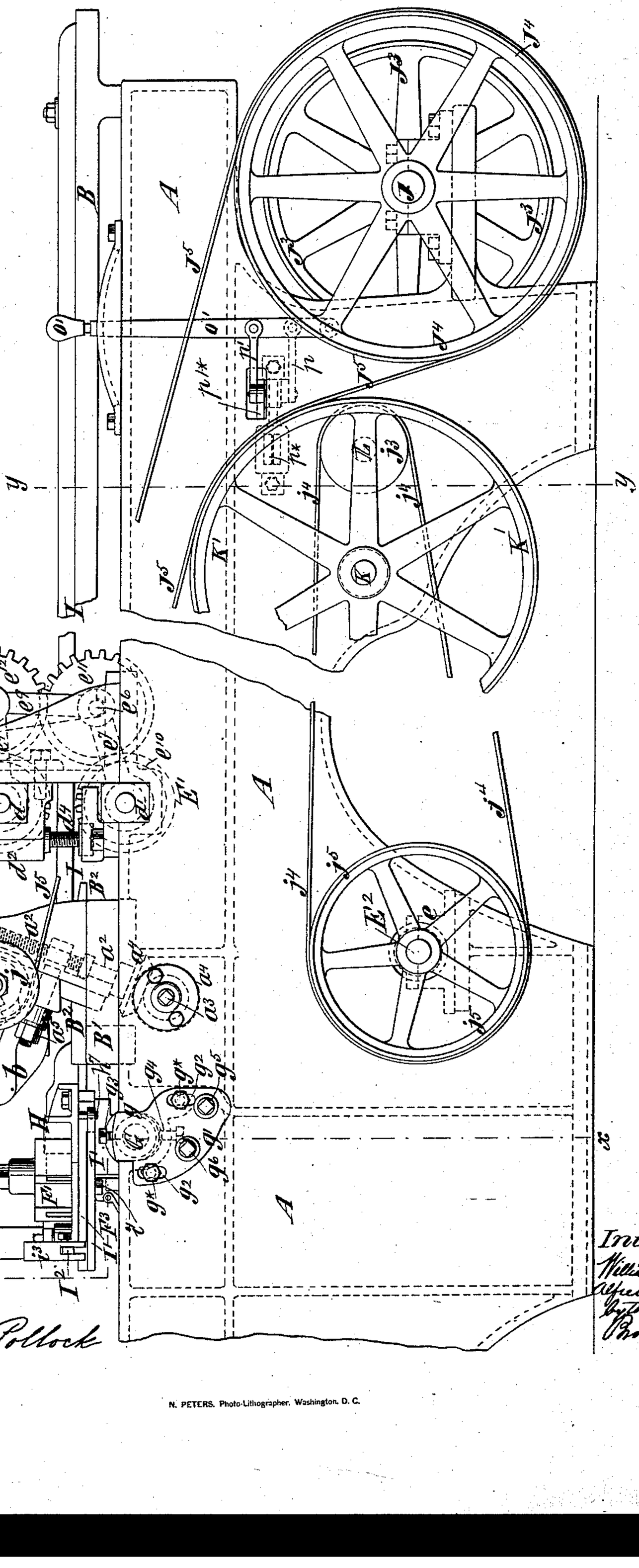
(No Model.) 5 Sheets—Sheet 1.

W. H. GRAY & A. HUTCHINSON.

WOOD PLANING MACHINE.

No. 315,406. Patented Apr. 7, 1885.

Fig. 1.



Witnesses:
C. L. Sundgren
Matthew Pollock

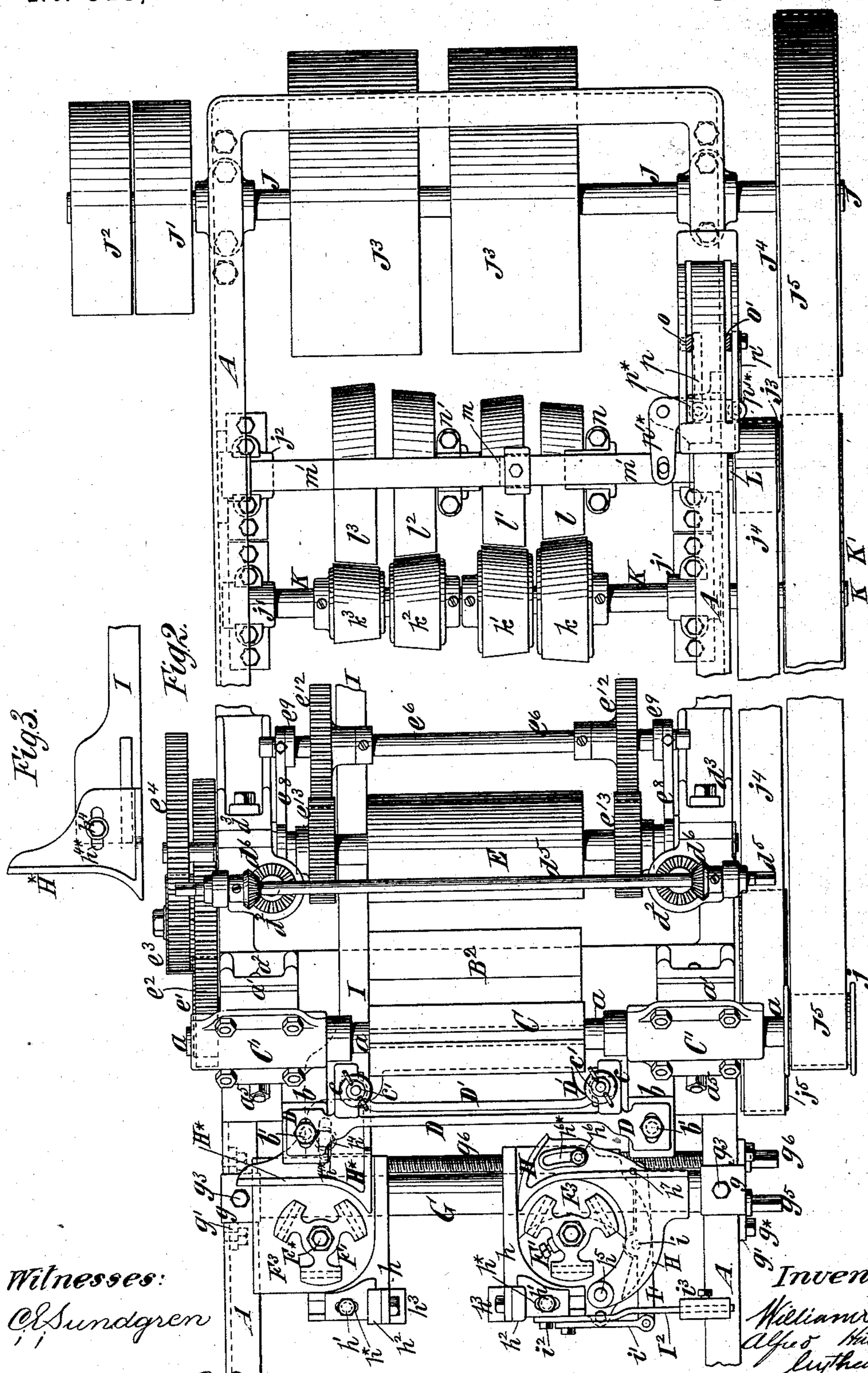
Inventors
William H. Gray
Alfred Hutchinson
By their Attys.
Brown & Hall

(No Model.) 5 Sheets—Sheet 2.

W. H. GRAY & A. HUTCHINSON.

WOOD PLANING MACHINE.

No. 315,406. Patented Apr. 7, 1885.



Witnesses:
C. L. Sundgren
Matthew Pollock

Inventors
William H. Gray
Alfred Hutchinson
by their Attys.
Brown & Hall

(No Model.) 5 Sheets—Sheet 3.

W. H. GRAY & A. HUTCHINSON.

WOOD PLANING MACHINE.

No. 315,406. Patented Apr. 7, 1885.

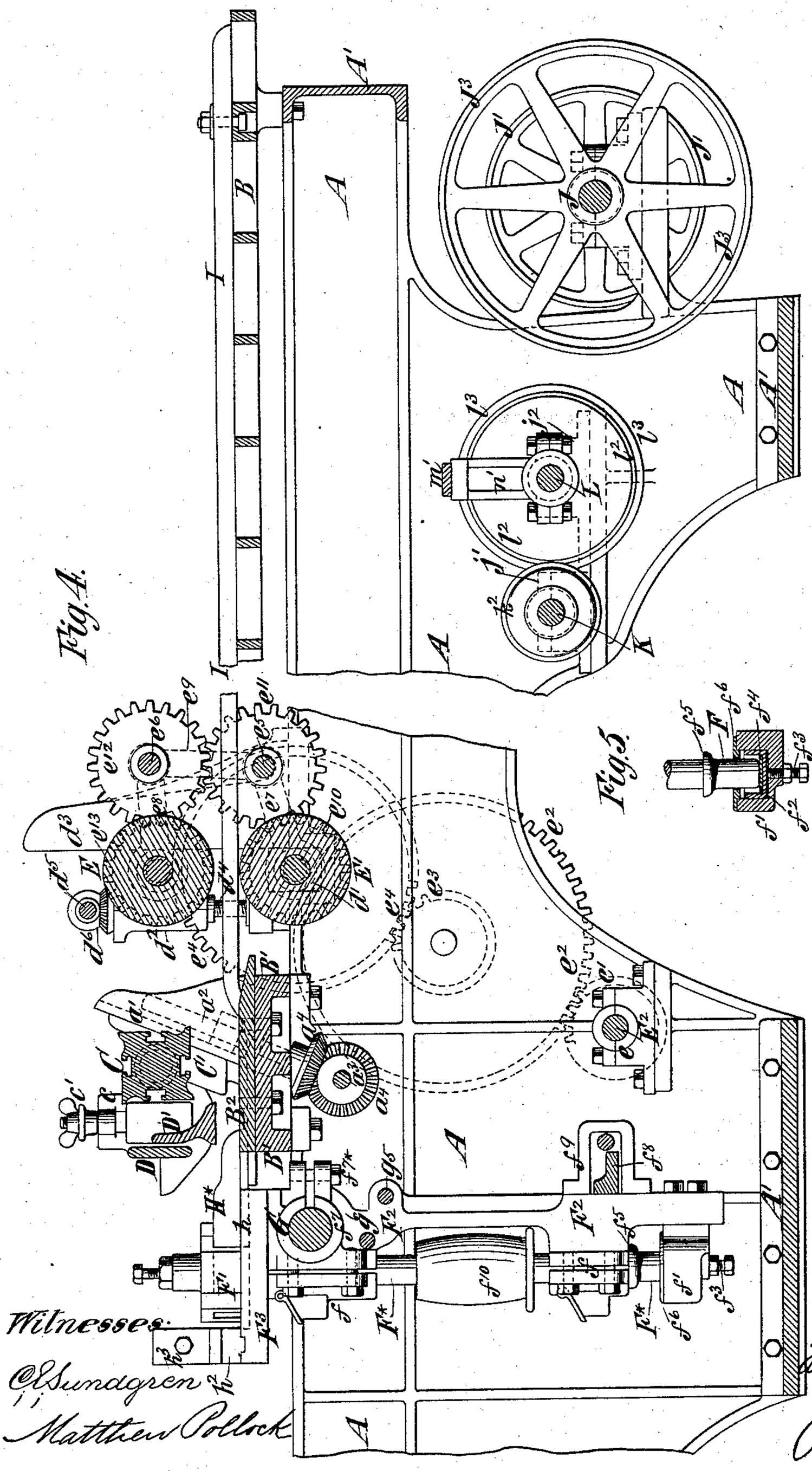


Fig. 4.

Fig. 5.

Fig. 6.

Witnesses:
C. L. Sundgren
Matthew Pollock

Inventors
William H. Gray
Alfred Hutchinson
by their Attys.
Brown & Hall.

(No Model.) 5 Sheets—Sheet 4.

W. H. GRAY & A. HUTCHINSON.

WOOD PLANING MACHINE.

No. 315,406. Patented Apr. 7, 1885.

Fig. 8.

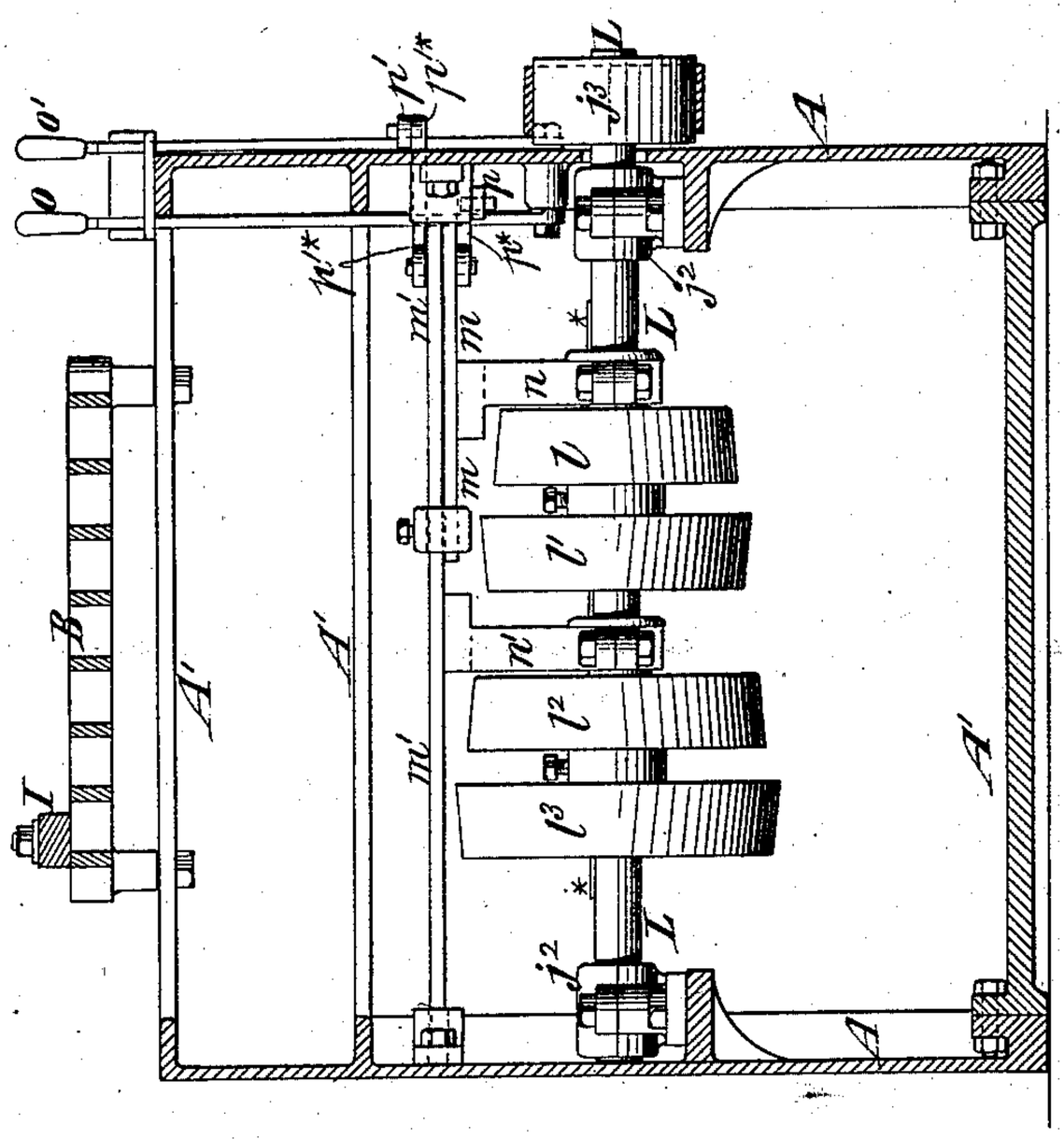
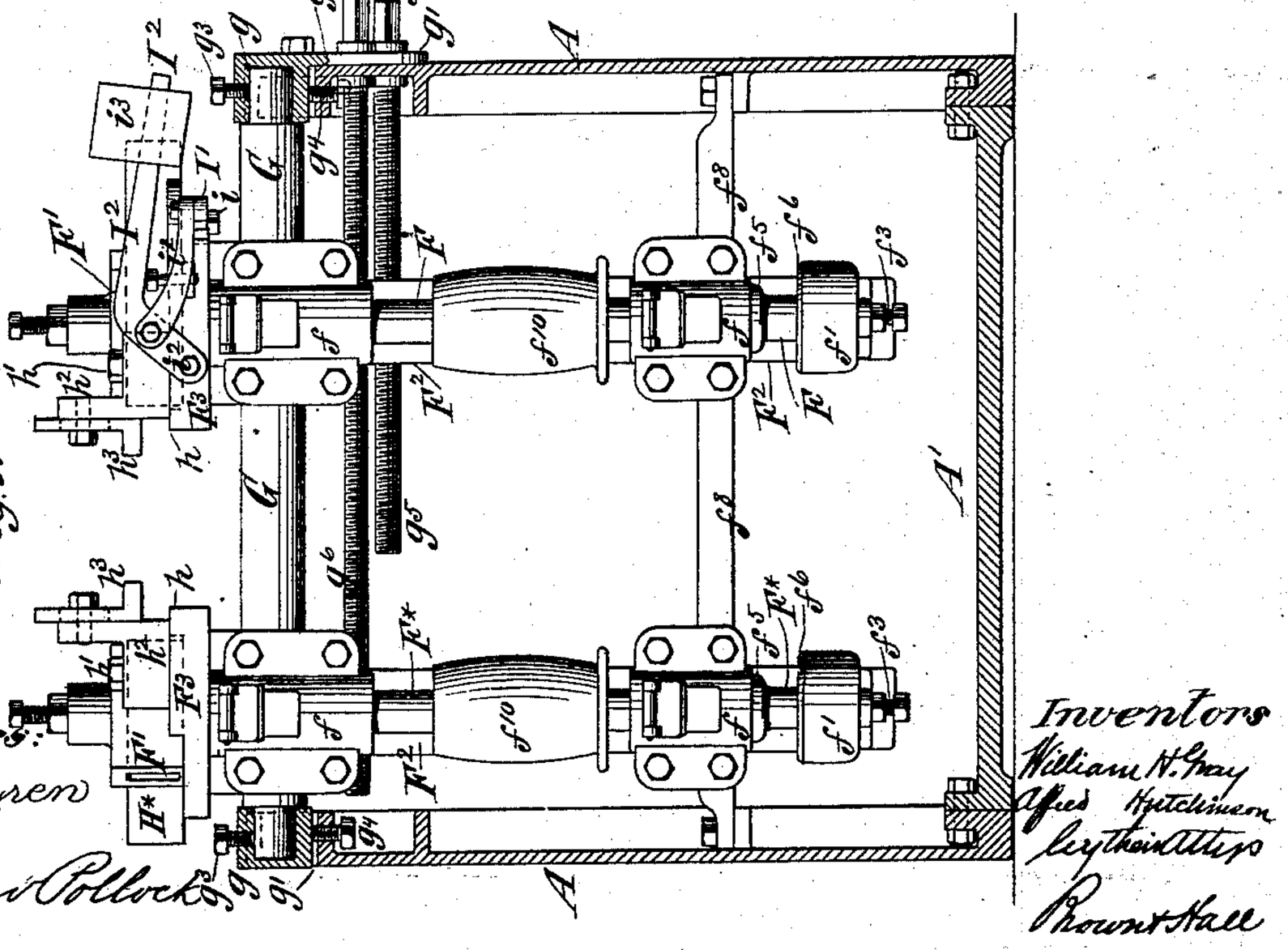


Fig. 7.



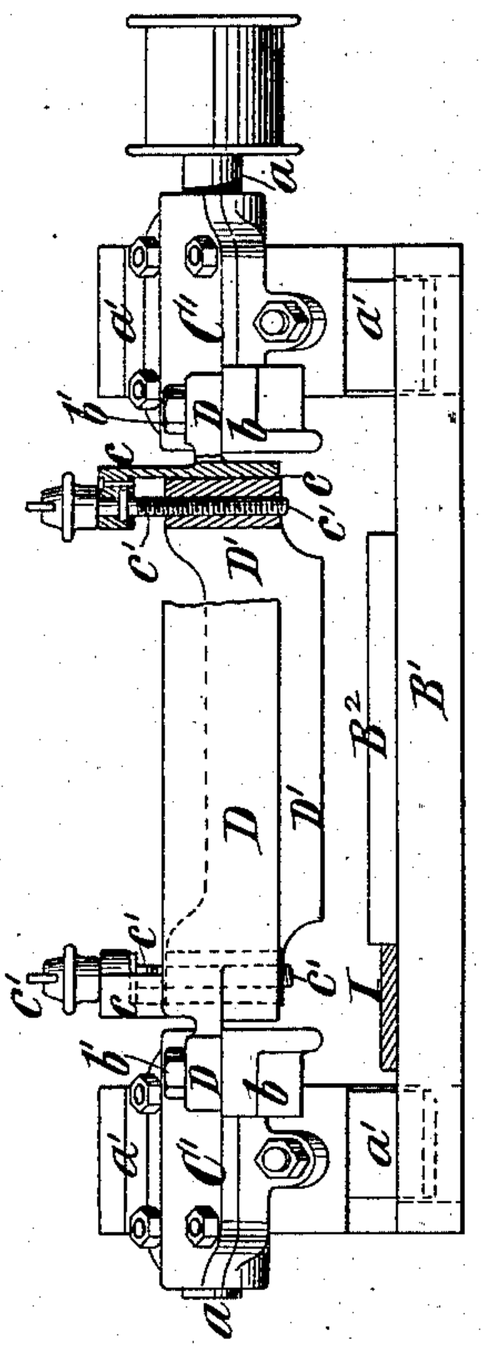
(No Model.) 5 Sheets—Sheet 5.

W. H. GRAY & A. HUTCHINSON.

WOOD PLANING MACHINE.

No. 315,406. Patented Apr. 7, 1885.

Fig. 9.



Witnesses:
C. L. Sundgren
Matthew Pollock

Inventors
William H. Gray
Alfred Hutchinson
by their Attys
Brown & Hall

UNITED STATES PATENT OFFICE.

WILLIAM H. GRAY AND ALFRED HUTCHINSON, OF BROOKLYN, NEW YORK, ASSIGNORS TO THE GLEN COVE MACHINE COMPANY, (LIMITED,) OF SAME PLACE.

WOOD-PLANING MACHINE.

SPECIFICATION forming part of Letters Patent No. 315,406, dated April 7, 1885.

Application filed January 26, 1885. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM H. GRAY and ALFRED HUTCHINSON, both of Brooklyn, (Green Point,) in the county of Kings and State of New York, have invented a new and useful Improvement in Wood-Planing Machines, of which the following is a specification.

Our invention is applicable to all wood-planing machines in which an upper cutter shaft and head are employed, whether they are provided with an under cutter shaft or head or not.

Ordinarily the journal-boxes of the upper cutter-shaft have been tied together and held in line by a yoke or cross-bar attached to them at its ends and extending across through the cutter-bed and below the platen-plate, and in order to remove the upper cutter-head and its boxes it has been necessary to first remove the platen-plate.

One object of our invention is to connect the cutter-head boxes by means which are above the bed and platen-plate, and which permit of the ready removal of the cutter-head, its journal-boxes, and the means whereby they are connected and braced without removing the platen-plate.

In connection with each of the side cutter-heads of a planing-machine is usually employed a chip-breaker and shaving-bonnet, the one on one side of the machine being usually fixed but adjustable, and the one on the other side of the machine being commonly acted upon by a spring to hold it forcibly against the work. When a heavy cut is being made, the chip-breaker is of course pressed back by the lumber, the spring being thereby compressed. Consequently, the chip-breaker heretofore used has been pressed most strongly against the work at the very time when the heaviest cut is being taken, and the unusual resistance to the feed due to the extra heavy cut has been augmented by the increased pressure of the spring-actuated chip-breaker.

Another object of our invention is to provide a movable and self-adjusting chip-breaker, which, in lieu of being pressed more forcibly against the work when a heavy cut is being taken, will be then pressed against the work with no more force, and, preferably, even with less force, so that the resistance to the feed produced by the chip-breaker will be actually reduced when by a heavy cut the resistance produced by the cutter-head is increased. By such provision we render more nearly uniform the sum of the resistance to the feed which is produced by the cutter-head and chip-breaker.

Ordinarily the two side cutter-spindles are journaled in frames which are mounted on a transverse bar, along which they may be moved in a direction transversely of the machine by means of adjusting-screws to bring one or both side cutter-heads into position for acting on the edge or edges of the lumber. Each spindle-supporting frame has at the top a side head-plate having a narrow raised portion which should be level with the platen-plate, and over and in contact with which the lumber passes. The narrow work-supporting surfaces of the side head-plates become worn rapidly; and a further object of the invention is to provide for the ready adjustment of the side head-plates, and with them the spindle-supporting frames, cutter-heads, and chip-breakers, so that the work-supporting surfaces of said head-plates may be set level with the platen-plate.

The chip-breaker, which is commonly fixed in position while the machine is in operation, should come as near as possible to the cutting circle of the side cutter-head in conjunction with which it acts; and a further object of the invention is to provide for the adjustment of the normally-fixed chip-breaker in a direction lengthwise of the machine and relatively to the side guide which extends usually from the feeding end of the machine forward beyond the upper cutter-head.

A further object of the invention is to provide a very effective variable feed mechanism, whereby the feed may, without change of belts or pulleys, be varied when changing from one quality of lumber to another, or where a light cut is commenced at one end of the lumber and becomes gradually heavier, owing to the increased thickness of the lum-

ber. When the speed of the cutter-heads becomes slacked by reason of the heavy cut, the feeding can by our improved mechanism be readily lessened until the cutter-heads attain their normal speed.

All the above objects and others of minor importance are attained by combinations of parts and features of construction, which will be hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of as much of a planing-machine as is necessary to illustrate the invention, representing the feeding end of a machine and rearward therefrom to a point beyond the side cutter-heads, a portion of the machine between the feeding end and the feed-rolls being broken away to reduce the length of the figure. Fig. 2 is a plan of as much of the machine as is shown in Fig. 1. Fig. 3 represents one of the chip-breakers and the corresponding side guide detached from other parts. Fig. 4 is a longitudinal vertical section of as much of the machine as is shown in Figs. 1 and 2. Fig. 5 represents the lower portion of one of the side cutter-spindles and a sectional view of a step therefor. Fig. 6 is a horizontal section of the spindle and a plan of the step, the cover of the latter being removed. Fig. 7 is a transverse vertical section on the plane of the dotted line *x x*, Fig. 1. Fig. 8 is a similar section on the plane of the dotted line *y y*, Fig. 1; and Fig. 9 is an elevation, partly in section, of the bed, platen-plate, and the journal-boxes and appurtenances of the upper cutter-head.

Similar letters of reference designate corresponding parts in all the figures.

A designates the main side frames of the machine, and A′ transverse or cross-sections of the framing.

B designates the bed or grating at the feeding end of the machine over which the lumber is passed into the machine, and B′ designates the cutter-bed on which is supported the platen-plate B^2.

C designates the upper cutter-head, preferably formed of steel, with solid integral journals *a*, mounted in suitable journal-boxes, C′. As shown in Fig. 4, the cutter-head C is preferably grooved or channeled for the attachment of cutters or knives, and its boxes C′ are fitted to slideways *a′*, shown as slightly inclined, and along which they may be moved by screws a^2, to raise and lower the cutter-head C. One such screw a^2 is provided for each journal-box C′. The screw is held against lengthwise movement in a suitable bearing, and engages with a nut on the box. Both the screws a^2 are geared together by a cross-shaft, a^3, and suitable bevel-wheels, a^4, and by turning said shaft, which may be done by a wrench applied to the end thereof, the boxes and cutter-head may be raised and lowered in a well-known manner. After the boxes C′ are properly adjusted they may be clamped in place by suitable nuts and bolts, a^5, as is usual in planing-machines.

On the journal-boxes C′ are projecting flanges or brackets *b*, and D designates a cross-bar or tie-piece which is secured at its ends by bolts *b′* to these flanges or brackets. This bar D extends across the machine back of the cutter-head C, and serves to tie the boxes C′ together and hold them rigidly in alignment.

In or projecting from the bar D, and formed integral therewith by casting, are pockets or housings *c*, and in these pockets or housings are fitted the ends of a presser-bar, D′, which extends across parallel with and in front of the cross-bar D. At the two ends of the presser-bar D′ are screws *c′*, which are held against lengthwise movement in the pockets or housings *c*, and by turning which the presser-bar D′ may be adjusted upward and downward. The construction and relative arrangement of these parts are best shown in Fig. 9. The construction of the pockets or housings *c* for the presser-bar D′ in the bar D, and the arrangement of this latter bar behind the cutter-head C, enables the boxes C′ and the two bars D D′ to be removed from the machine as one piece for repair or any other purpose, and without loosening and removing the platen-plate B^2.

Inasmuch as the pockets or housings *c* for the ends of the presser-bar D′ are formed on and rigidly connected by the same cross-bar D which connects the journal-boxes C′, the pockets or housings are kept in line, and there is no danger of the ends of the presser-bar binding in them.

In front of the cutter-head C are the upper and lower feed-rolls, E E′. The lower roll, E′, is in fixed bearings *d′*; but the bearings *d* of the upper roll, E, are held in place by yokes or frames d^2, which are capable of sliding upward and downward on uprights or standards d^3 to vary the distance between the rolls, and may be thus adjusted each by a screw, d^4. The two screws d^4, at opposite sides of the machine, are geared together by a cross-shaft, d^5, and bevel-wheels d^6, and by this means the upper roll, E, may be raised and lowered. The feed-rolls are driven from a counter-shaft, E^2, which is journaled in boxes *e*, and this shaft, through a pinion, *e′*, a wheel, e^2, a pinion, e^3, and a wheel, e^4, or any other suitable system of gears, drives the lower feed-roll, E′.

In front of the rolls E E′ are two shafts, e^5 e^6, which are connected together and with the shafts or journals of the two feed-rolls by swinging arms e^7 e^8 and links or rods e^9, and by means of wheels e^{10} on the lower feed-roll, wheels e^{11} e^{12}, whereby the shafts are geared together, and other wheels, e^{13}, on the upper feed-roll, the upper feed-roll is driven and provision is afforded for adjusting it without interfering with its driving. The shafts e^5 e^6 and their wheels and attachments are supported by the lower shaft, e^5, overlapping and

resting on the side frames, A, or the uprights or standards d^3.

F F* designate the two upright side cutter-spindles, which are arranged side by side transversely of the machine, and carry at their upper ends side cutter-heads, F'. Each shaft is supported in bearings f in a frame, F^2, and has at the bottom a step-bearing, also attached to the frame. The construction of this step is shown in Figs. 5 and 6. It consists of a bracket or socket-piece, f', in which is fitted a cup, f^2, which is here shown as polygonal in shape, and may be set up or raised by a set-screw, f^3. This cup f^2 is shown as larger than the shaft or spindle F, and is intended to hold oil. In its bottom is a removable disk or plate, f^4, on which the end of the spindle rests, and which may be renewed when worn out. The upward movement of the spindle is prevented by a fast collar, f^5, thereon bearing against the lower bearing, f, and the wear may be compensated for by setting up the screw f^3. This step-bearing is closed by a removable cap or cover, f^6.

The spindle-frames F^2 are supported by a bar, G, extending transversely across the machine, each frame having a split sleeve or collar, f^7, and a bolt, f^7*, whereby it is secured on said bar, and the frames F^2 also bear near their lower ends against a cross-bar, f^8, and have yokes or loops f^9, which loosely embrace said bar f^8. The bar G, which is non-rotary, is supported at its ends in bearings g, formed in plates or cheek-pieces g', bolted to the side frames, A, as shown in Figs. 1 and 7, by bolts g*, which pass through slots g^2 therein. In the bearings g are set-screws g^3, whereby the bar G may be held against turning, and below them are also set-screws g^4, which are inserted through a portion of the frames A and bear against said bearings. By turning the set-screws g^4 the bar G, the spindle-frames F^2, and all attachments thereof may be raised and lowered, for a purpose hereinafter described, and by then tightening the bolt g* the side plates or cheek-pieces g' and the bar G may be securely held after adjustment.

The spindle-frames F^2 and all their appurtenances may be adjusted toward and from each other by screws g^5 g^6, which are held against lengthwise movement in the cheek-piece g', and engage with nuts, one on each frame F^2.

Just below each side cutter-head, F', is a head-plate, F^3, on the frame F^2, and these head-plates have raised surfaces h, which should be level with the platen-plate B^2. These surfaces, being narrow and being rapidly worn, require to be adjusted into position relatively to the platen-plate B^2. The adjusting-screws g^4 provide for such adjustment. To each side head-plate, F^3, is adjustably secured by means of a bolt and slot, h' h*, an upright or knee-piece, h^2, which forms an edge guide, and has secured to it, also adjustably, a lip or top guide, h^3, as best shown in Fig. 7.

To the side head-plates, F^3, are attached chip-breakers H H*, each presenting a curved surface on the side of the side cutter-head which conforms quite closely to the cutting-circle and forms a shaving-bonnet, whereby shavings from the side head are directed in a lateral direction from the machine. The chip-breaker H* is here shown as adjustably fixed in position, while the chip-breaker H is movable and made to exert a yielding pressure on the edge of the lumber.

I designates a side or edge guide extending rearward from the feeding end of the machine over the platen-plate B^2, and having its rear end flattened or extended laterally. The chip-breaker H* is secured to the edge or side guide, I, by bolts h^4 and slots h^4*, as shown in Fig. 3, and hence may be adjusted relatively to the edge guide, I, toward and from the side cutter-head, F', in conjunction with which it operates.

The chip-breaker H consists of a lever fulcrumed at h^5, to swing in a horizontal plane and limited in its movements by a pin or bolt and slot, h^6 h^6*, or other suitable stop. At its outer and under side this side head-plate, F^3, is rabbeted or recessed to receive another horizontally-moving lever, I', fulcrumed at i and having its rear end bearing on a pin, h^7, projecting downward from the lever-like chip-breaker H, as shown in Fig. 1.

The forward end of the lever I' has attached to it a link or rod, i', whereby it is connected with a lever, I^2, fulcrumed at i^2 to the head-plate F^3, and on which is an adjustable weight, i^3, as shown in Figs. 1, 2, and 7. This weight i^3 always holds the point of the chip-breaker H against the side of the work; but when a very thick side cut is being taken the chip-breaker is pressed back, and thereby raises the weight i^3 more nearly perpendicular, where it exerts a diminished force, owing to its decreased leverage. Hence it will be seen that when the resistance is increased because of a heavy cut the resistance due to the pressure of the chip-breaker is decreased, and the sum of the two resistances to the feed is more nearly uniform. If desired, both chip-breakers might be made to yield in the way described with reference to the chip-breaker H.

We will now describe the feed mechanism and the method of driving the several parts.

At the feeding end of the machine is a cross-shaft, J, on which are fast and loose driving-pulleys J' J^2 for a driving-belt, and pulleys J^3, or a drum from which motion is transmitted by quarter-twist belts to the pulleys f^{10} on the side cutter-spindles, F F*. These belts are here omitted in order that other parts may be more clearly shown. On the shaft J is also a pulley, J^4, from which a belt, J^5, extends to a pulley, j, on the cutter-head journal a, by which the said upper cutter-head is driven. In practice there would be another pulley similar to J^5 on the other end of the shaft J, and a second belt for driving the upper cutter-head, C; but these are omitted, as they form no part of our invention.

K designates a shaft extended transversely across the machine and mounted in bearings j'. Upon its end is a pulley, K′, as shown in Fig. 1, and by reference to said figure it will be seen that the bolt J^5 partly encircles the pulley K′, and so imparts to the shaft K a constant and uniform rotary motion. This shaft K may be termed the "driving feed-shaft," and parallel with it, and in bearings j^2 is a second shaft, L, which we may term the "driven feed-shaft." The shaft L receives from the uniformly-rotating shaft K a variable speed, as we shall soon describe, and through a pulley, j^3, on its end, a belt, j^4, and a pulley, j^5, on the shaft E^2, all as shown in Fig. 1, such a variable rotation is imparted to the latter shaft and thence to the feed-rolls.

Where there is a lower cutter-head, it may be driven by a belt passing around the pulley K′ beneath the belt J^5, and, like said pulley, receiving motion from the belt J^5.

Fast on the shaft K are two pairs of reversely-set conical friction-wheels, k k' k^2 k^3, and ranging therewith on the shaft L are a corresponding number of reversely-set conical wheels, l l' l^2 l^3. Not only are the wheels of each pair l l' or l^2 l^3 set reversely to each other, but the wheels of each pair are set reversely to the corresponding pair of wheels, k k' or k^2 k^3. The pairs of wheels l l' and l^2 l^3 are loose and free to slide on the shaft L, with which they are connected by splines or feathers *, and the wheels of each pair are connected so as to move as one piece. When the wheels l l', &c., are in mid-position, as shown in Fig. 2, they are out of contact with and receive no motion from the wheels k k', &c.; but when a pair of wheels, l l', for example, are moved one way or the other one or other of them is brought into frictional gear with the wheel k or k', and the pair of wheels l l' are thereby driven and transmit motion to the shaft L. It will be observed that the wheels k k', &c., decrease in diameter in the order named, while the wheels l l', &c., increase in diameter in the order named. It will therefore be readily understood that when the wheel l is brought into frictional gear with the wheel k the shaft L and the feed-rolls E E′, deriving motion therefrom, will be driven faster than when the wheel l^3 is in frictional gear with and receives motion from the wheel k^3.

Above the sliding friction-wheels l l', &c., are two bars, m m', capable of sliding lengthwise, and having the two pairs of wheels l l' and l^2 l^3 connected with them by arms or hangers n n'.

Near the feeding end of the machine and at the side thereof are two lever-handles, o o', the former of which, o, is connected through a link or rod, p, and a bell-crank lever, p*, with the bar m, and the latter of which, o', is connected through a link or rod, p', and a bell-crank lever, p'*, with the other rod or bar, m'. Consequently, moving one or the other of the lever-handles o or o', the shaft L may be driven through any wheel k k', &c., and its corresponding wheel, l l', &c., and the feed may thereby be varied, as may be desired.

The wheels k k', &c., may be of paper, and the wheels l l', &c., of metal, or they may be of any other materials which will give the required amount of friction and not be subject to excessive wear.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In a wood-planing machine, the combination, with a platen-plate and an upper cutter-head and its journal-boxes above the platen-plate, of a presser-bar and pockets or housings wherein said bar may be adjusted vertically, and a cross-bar independent of the presser-bar extending across the machine above the platen-plate and connecting the pockets or housings and journal-boxes, substantially as herein described.

2. The combination, with the platen-plate B^2 and upper cutter-head and journal-boxes C C′, of a presser-bar, D′, and a cross-bar, D, connecting the journal-boxes C′, and provided with pockets or housings c, wherein the ends of the presser-bar are adjustable vertically, and which are kept in line by the cross-bar D, substantially as herein described.

3. The combination, with the side cutter-head of a wood-planing machine, of a chip-breaker movable toward and from the work, a weight, and connections through which the weight produces a variable pressure of the chip-breaker upon the lumber, such pressure being decreased as the thickness of the cut increases, substantially as herein described.

4. The combination, with a side cutter-head, F′, a head-plate, F^3, below the same, and a chip-breaker, H, pivoted at h^5, and movable on the head-plate toward and from the work, of the weight i^3, and the levers I′ I^2, and rod i', through which the chip-breaker is pressed against the work with a force which decreases as the thickness of the cut increases, substantially as herein described.

5. The combination, with the side cutter-spindle, F*, and head-plate F^3 of a wood-planing machine, of a frame, F^2, wherein the spindle is journaled and which supports the head-plate F^3, a cross-bar, G, supporting the frame F^2, and along which said frame is movable, and slotted plates g', in which the ends of the bar G are supported and which are bolted to the side frames of the machine, and screws g^3, whereby said slotted plates with the bar G and parts supported thereby may be adjusted vertically to compensate for wear of the head-plate F^3, substantially as herein described.

6. In a wood-planing machine, the combination, with a side cutter-head and a side or edge guide, I, extending lengthwise of the machine, of a chip-breaker, H*, having a slotted connection with said guide, whereby provision is afforded for the adjustment of the chip-breaker in a direction lengthwise of the

machine relatively to the cutter-head and guide, substantially as herein described.

7. In a wood-planing machine, the combination, with the driving and driven feed-shafts K L, arranged parallel with each other near the front end of the machine and their reversely-set conical friction-wheels arranged as described, the wheels on the shaft K being fast thereon, and the wheels on the shaft L being connected in pairs and having a sliding connection with the shaft L, of a belt and pulleys for driving the shaft K, levers at the front end of the machine, connections through which the pairs of sliding friction-wheels are moved in one or other direction by the movement of said levers, the counter-shaft E^2 and feed-rolls geared therewith, and a belt and pulleys for transmitting a variable rotary motion from the shaft L to the shaft E^2, substantially as herein described.

WM. H. GRAY.
ALFRED HUTCHINSON.

Witnesses:
GEO. W. PAYNTAR,
JAMES F. WELCH.