C. L. Pierce,

Sawing Shingles,

No. 55,702, Patented June 19, 1866.

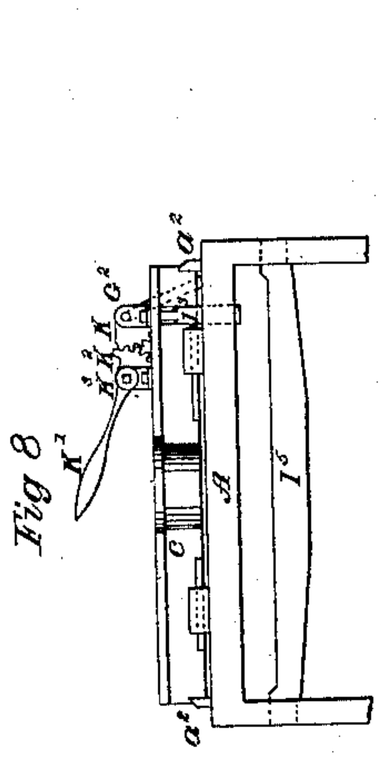
Fig 8

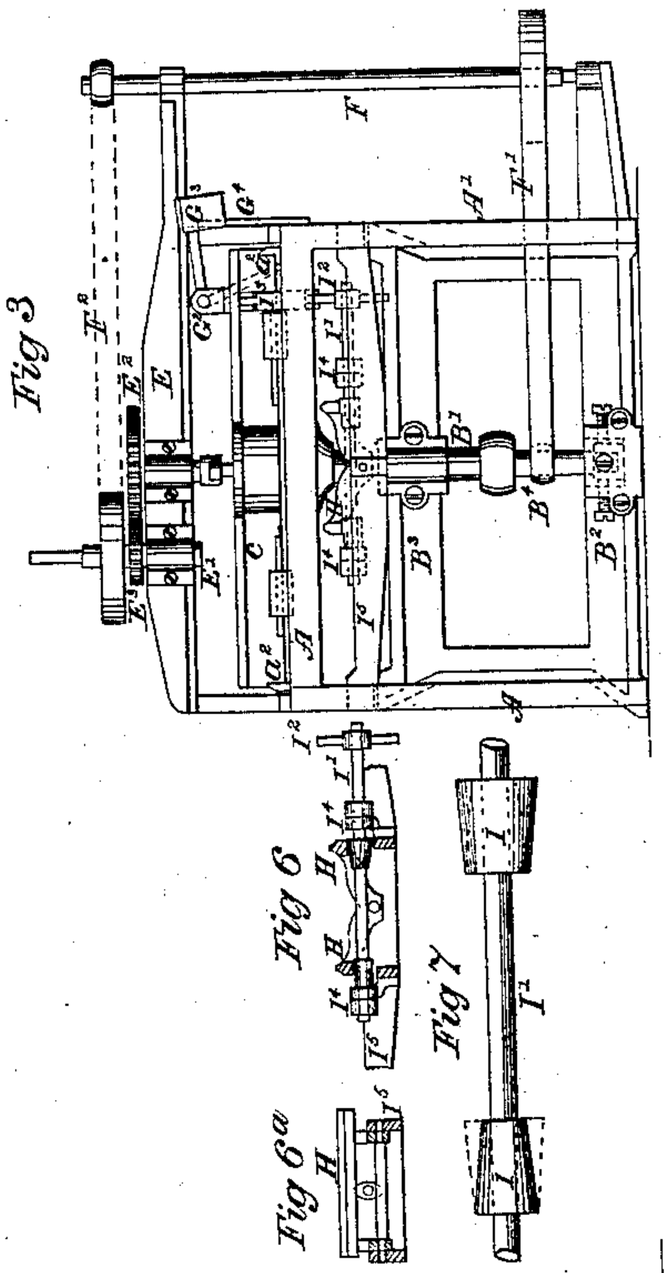
Fig 3

Fig 6

Fig 7

Fig 6a

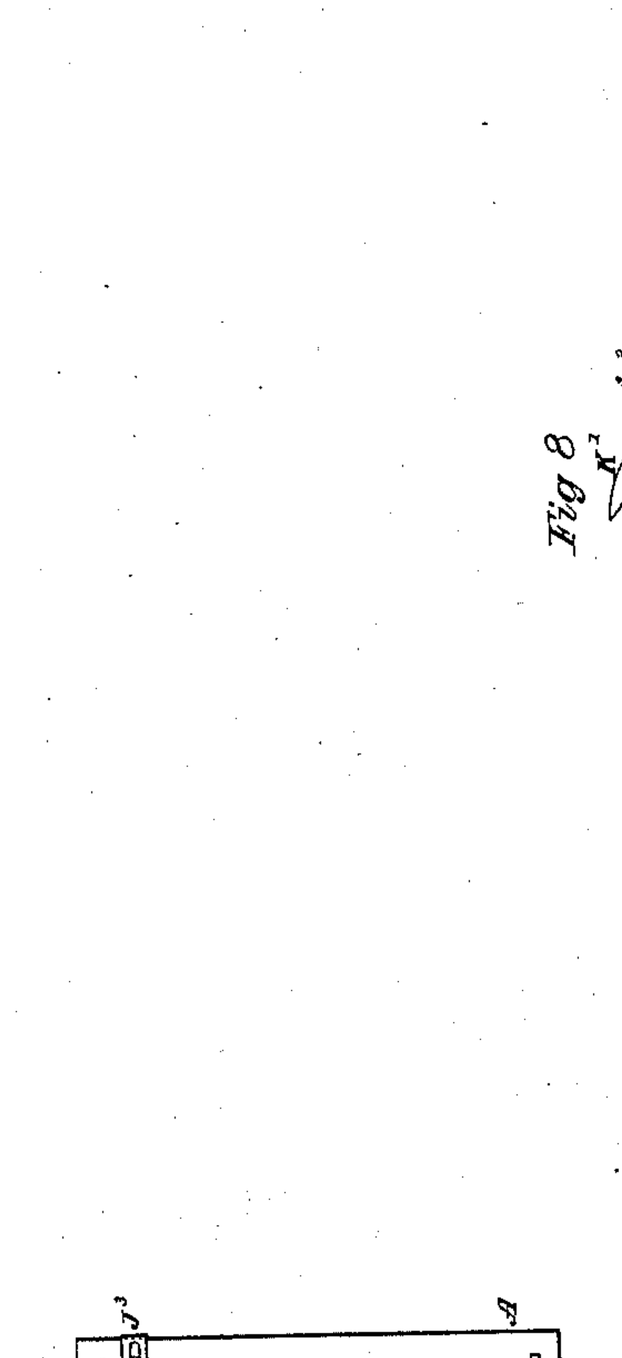
Fig 2

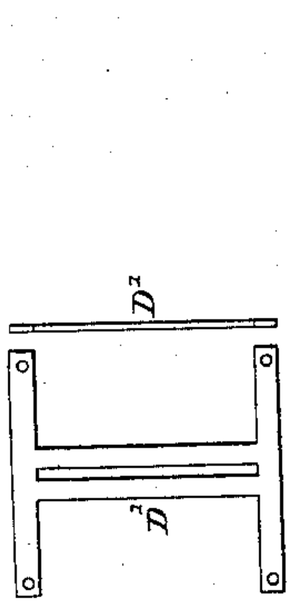
Fig 5

Fig 4

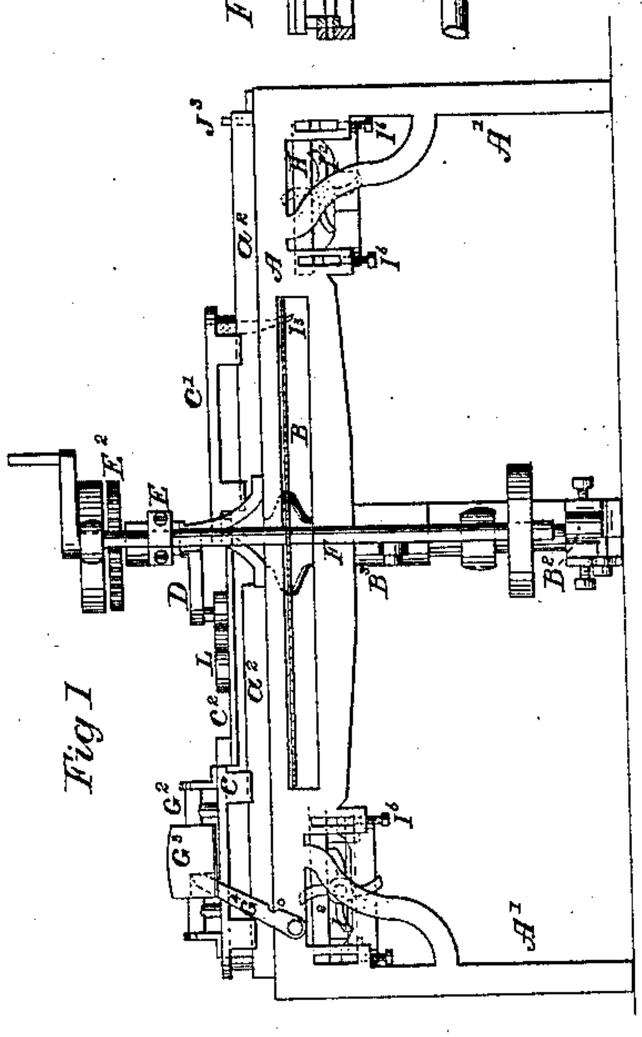
Fig 1

Wilnesses:

W. H. Forbush

B. B. Muehle

Inventor:

Chas. L. Pierce

UNITED STATES PATENT OFFICE.

CHARLES L. PIERCE, OF BUFFALO, NEW YORK.

IMPROVEMENT IN SHINGLE-MACHINES.

Specification forming part of Letters Patent No. **55,702**, dated June 19, 1866.

To all whom it may concern:

Be it known that I, CHARLES L. PIERCE, of the city of Buffalo, county of Erie, and State of New York, have invented certain new and useful Improvements in Shingle-Sawing Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification.

The nature of this invention consists, first, in giving a reciprocating motion to a double block-carriage of a shingle-sawing machine by an overhung crank working in a slotted cross-head attached to said block-carriage; second, in a modification of the slotted cross-head by which the crank is made to give a uniform reciprocating motion to the block-carriage, the same being also an improved mode of converting circular into reciprocating motion, applicable to other purposes; third, in the construction of two individual devices for "dogging" the shingle-block automatically, the one operating by a weight and the other by a spring, also a device for dogging the block by hand-power; fourth, in the use of two double taper-cams upon one shaft, to alternately tilt the block-bed and give the taper to the shingle, said cams being capable, by a simple longitudinal adjustment of the shaft, of increasing or diminishing the degree of taper in the shingle, as may be required.

In the annexed drawings, Figure I is a side elevation of my improved machine. Fig II is a plan, and Fig. III is an end elevation, of same. Fig. IV is a detail view of device obtaining uniform reciprocating motion of block-carriage. Fig. V is a detail view of slotted cross-head, to be used in place of device shown in Fig. IV. Figs VI and VI^a, detail view of tilting block-bed; Fig. VII, details of double-taper-cams and shaft for tilting block-bed. Fig. VIII shows a device for operating the shingle-block dogs by hand-power.

Letters of like name and kind refer to like parts in each of the figures.

A represents the bed-frame of the machine, rectangular in form and supported by the legs A′. The side rails of this frame carry the parallel tracks a^2 a^2 upon which the block-carriage reciprocates.

B represents the circular cutting-saw, of large diameter and supported by a vertical spindle, B′, at the center of the rectangular bed-frame, said spindle having its bearings in appropriate transverse bridge-trees B^2 B^3. The saw is driven by a belt acting on the pulley B^4 on the saw-spindle.

C C′ represent the double block-carriage, consisting of two open rectangular frames C and C′, which receive the shingle-blocks, said frames being arranged one on either side of the saw, but connected together by cross-bars C^2, so that they reciprocate together and as one frame upon the tracks a^2 a^2, by which they are supported above the plane of the saw. Being on opposite sides of the saw and connected together, as one frame approaches the other recedes from the saw, and vice versa, so that both frames being supplied with blocks, the saw is kept constantly at work, or nearly so.

The reciprocating motion of the frame is given by an overhung crank, D, (the axis of which coincides with that of the saw,) working in a slotted cross-head, D′, attached to the frame connection-bars C^2, and equidistant from each frame, C and C′, or, when a uniform motion of the saw-carriage is desired, in a peculiar-shaped cam-slot, which will be hereinafter described.

The crank D is supported by a transverse bridge-tree, E, which also supports a short counter-shaft, E′, which is geared with the crank-shaft by a spur-wheel and pinion, E^2 E^3.

The lower bridge-tree, B^2, is extended at one side of the machine, as is also the upper bridge-tree, E, to support the vertical shaft F, said shaft being driven by a belt, F′, from the saw-spindle, and transmitting motion to the crank D by a belt, F^2, leading to the counter-shaft E′. The motion of the saw-spindle must be reduced by a proper proportioning of the pulleys and gears on the shafts F and E′, so as to cause a proper relation to exist between the velocity of the block-carriage and that of the saw, which will be from one-half to one-inch movement of the carriage to one revolution of the saw.

Each frame of the block-carriage is provided with a dogging device, by which the shingle-block is held therein to be carried to the saw. On each side of the saw, and nearly in the plane thereof, is a tilting block, table, or bed, by which, in connection with the dogging

device, the position of the blocks is changed at each movement of the carriage in a manner to present them to the saw in such position as to give the required taper to the shingles as they are cut from the block.

For convenience, I will describe the construction and operation of the dogging and tilting mechanism as affecting one block only, it being understood that from the arrangement and motion of the block-carriage one block is being sawed while the other is passing back to be dogged. Two different forms of the dogging device are represented, one form being shown as connected with the frame C, and the other as connected with the frame C′. Either form may be used on both frames. Both forms have a stationary toothed bar, G, and a parallel but movable toothed bar, G′, between which the shingle-block is held. In the first instance the movable bar G′ is operated by a bell-crank, G^2, hinged to the frame C, one arm of the crank being connected with a bar and the other carrying a weight, G^3, the action of which is to throw the movable dog-bar toward the stationary one, and thereby clamp the shingle-block between. The weight being raised draws back the movable dog-bar and releases the shingle-block. The operation of the moving dog-bar is made automatic by the attachment to the bed-frame A of a hinged lever, G^4, in such position that as the block-carriage, in returning the block from the saw, approaches the end of its movement in that direction the arm will strike a shoulder on the weight, and, by being carried by the weight from an inclined to an upright position, raise the same, and thereby release the shingle-block. At this time the block will be over the tilting table H, (belonging to that frame of the carriage in which the block is placed,) so that as it is released from the dogs it will drop thereon, and the plane of the table being properly inclined to that of the saw, the dogs, when they again close upon the block, will clamp it in that position, and in that position carry it to the saw, so that the taper of the shingle cut off will always correspond to the inclination of the table to the plane of the saw.

The closing of the dogs upon the block takes place immediately as the block, from the change in motion of the block-carriage, begins to move toward the saw by the disengaging of the weight G^3 from the arm G^4.

The inclination of the table requires to be reversed as each shingle is cut from the block, in order to work up the block evenly. For this purpose I employ two double taper-cams, I, upon a shaft, I′, placed at right angles to the line of movement of the block-carriage and to the axis upon which the table tilts, said cams bearing against the table on each side of its tilting axis, and, by a periodic movement imparted to them from the block-carriage, reverse the inclination of the table as required.

The form of the cams and their operation may be more specifically described as follows: Supposing the cam to be cut by a plane at right angles to its axis, the resulting section will be an ellipse, the major axis of which will decrease and the minor axis increase as the section may be taken nearer the base end, which is a circle; or the major axis will increase and the minor axis decrease as the section may be taken nearer the opposite end, so that supposing the cams to be cut by the plane of the major axis the resulting section will be a cone-frustum having for its larger base the greatest major axis and for its smaller base the shortest major axis, and supposing it to be cut by the plane of the minor axis, the resulting section will also be a cone-frustum, but reversed, having for its largest base the greater minor axis and for its smaller base the shortest minor axis.

The two cams are placed upon the shaft I′ in such relative position that the plane of the major axis of the one will coincide with the plane of the minor axis of the other, so that when the major axis of one cam bears against one side of the tilting table the minor axis of the other bears against the opposite side, so that the table is inclined in a degree corresponding to the difference between the major and minor axes; and as those are at right angles to each other, a quarter-revolution of the cams will bring the minor axis of the one into the position before occupied by the major, and the major axis of the other into the position before occupied by the minor, which will have the effect to change or reverse the inclination of the table. From this it will be seen that each quarter-revolution of the cams will reverse the inclination of the table. To give the quarter-revolution of the cams at the time required—*i. e.*, at the return of the block from the saw—a four-armed spider or ratchet, I^2, is attached to the cam-shaft I′, and a dog or pawl, I^3, is connected with the block-carriage, which will, as the carriage approaches the end of its movement, engage the said ratchet-teeth and give the required movement to the cams. A longitudinal or endwise movement of the cam-shaft in one direction will increase the difference between the major and minor axes bearing against the table, and consequently increase its inclination, while an opposite movement will decrease its inclination. To permit this longitudinal adjustment the cam-shaft is provided with collars I^4, which may be set thereon and changed as required.

As a change in the inclination of the table affects the taper of the shingles, it follows that any required taper may be obtained by a simple longitudinal adjustment of the shaft.

The tilting table and cam shaft are supported from the main bed-frame by cross-pieces I^5, which may be raised by set-screws I^6 to bring the block-table more or less above the plane of the saw, and thereby the thickness, as well as the taper, of the shingles cut may be regulated.

The second device, for dogging the block, (before spoken of) consists of a bell-crank, J, having its fulcrum at J′, one arm connected

with the movable dog-bar, the other with a spring-bar, J^2, passing through from side to side of the block-frame and projecting on one side, so that when the carriage reaches the extreme of its movement in one direction the projecting end may strike a stationary stop, J^3, on the bed-frame and be moved thereby in a manner to compress the spring and open the clamp-bar, the spring closing the clamp upon the block when allowed to do so by the return of the carriage.

The device shown in Fig. VIII, for operating the block-dogs by hand-power, consists of a gear-segment, K, applied to the shaft of the bell-crank G^2, and a lever and segment, $K' K^2$, having their fulcrum at K^3, so that by raising or lowering the lever-segment, the dog G′ will be operated. This will be found convenient frequently when it is desired to remove the wastage of the blocks from the machine, and would also be convenient should it be desired to operate the block-carriage by hand-power.

It now remains to describe the device for converting the circular motion of the crank into a uniform reciprocating motion of the block-carriage. The crank working in the straight slot of the cross-head D′ does not give a uniform motion to the block-carriage, but a motion which increases in velocity during the first quarter-revolution of the crank—*i. e.*, while the crank is passing from a position coincident with the line of movement of the carriage to a position at right angles thereto—and decreases through the second quarter, or until it again assumes a position coincident with the line of movement of the carriage. To obviate this and give the carriage equal progressive movements to equal angular movements of the crank, the slot in which the crank-pin works is made in the general form of a diamond, as shown at L, the sides, however, being curves of such form as will, by their varying angle to the line of movement of the carriage, compensate for the increase and decrease in movement which would be due to the peculiar movement of the crank, as above stated.

The crank, at the time that the carriage is at the extreme of its movement in one direction, stands at the middle angle of the slot; but when it has completed one-quarter of its revolution arrives at a side angle thereof, whence it returns, during the second quarter of its revolution, to the opposite middle angle, and thereby completes the movement of the carriage in one direction. The third quarter of its revolution carries it to the opposite side angle, and the fourth quarter returns it to the same middle angle from which it started, and completes the return movement of the carriage.

To compel the crank-pin to traverse the slot, as above stated, inclined springs or weighted trucks *m* are fitted in the first and third quarters of the slot, which, being depressed by the crank-pin as it passes through the slot, spring up behind the same and prevent its return through the same quarter, thereby compelling it to take the course through the slot, as before stated.

The object in giving a uniform movement to the carriage will appear from the following: The velocity with which a block may be fed to the saw is governed by the distance which the saw will cut into the same smoothly at each revolution, which distance we may assume to be three-fourths of an inch. Supposing the crank to work in the straight slot, giving the gradually increasing and diminishing feed, its maximum velocity could not exceed three-fourths of an inch without rough work being the consequence, and as its lowest velocity would be naught, the average would not be over one-half of an inch to a revolution. By the use of the cam-slot the maximum velocity of three-fourths of an inch to a revolution may be maintained all of the time, thus enabling the machine to be worked at one-fourth higher velocity and do one-fourth more work.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. Reciprocating the block-carriage which feeds the block to the saw in an unequal progressive movement by means of the crank-pin D, working in the slot of cross-head D′, substantially as described.

2. Imparting an equal progressive movement of the block-carriage by means of the diamond slot L and crank D, and thereby giving an equal and uniform feed of the shingle-block to the saw, substantially as set forth.

3. Operating the movable dog-bar G′ of the dogging device by a weighted bell-crank, G^2, working, in combination with the hinged lever G^4, on the bed-frame in the manner described.

4. Operating the movable dog-bar G′ of the dogging device by the bell-crank J and spring-bar J^2, working, in combination with the stop-piece J^3, on the bed frame in the manner described.

5. The arrangement and combination of the segment-lever $K' K^2$ with the bell-crank G^2, carrying segment K, and movable dog-bar G′, for the purpose of operating the dog-bar by hand-power.

6. The double-taper cams I, in combination with the tilting block-tables when arranged in relation to the block-carriage and operated thereby, in the manner and for the purpose set forth.

CHAS. L. PIERCE.

Witnesses:
W. H. FORBUSH,
B. H. MUEHLE.