(No Model.)

3 Sheets—Sheet 1

J. LAIRD.

SCROLL SAWING MACHINE.

No. 444,071. Patented Jan. 6, 1891.

Fig 1.

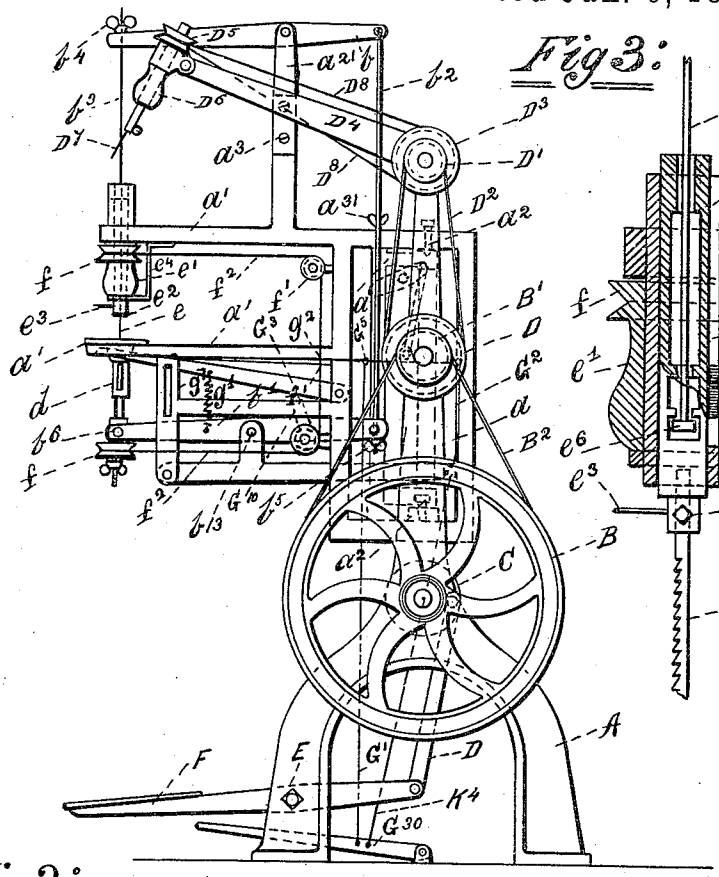
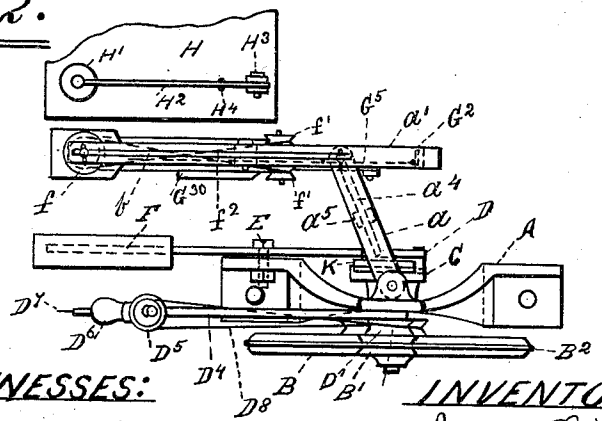


Fig 3.

Fig 2.



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Fig 4.

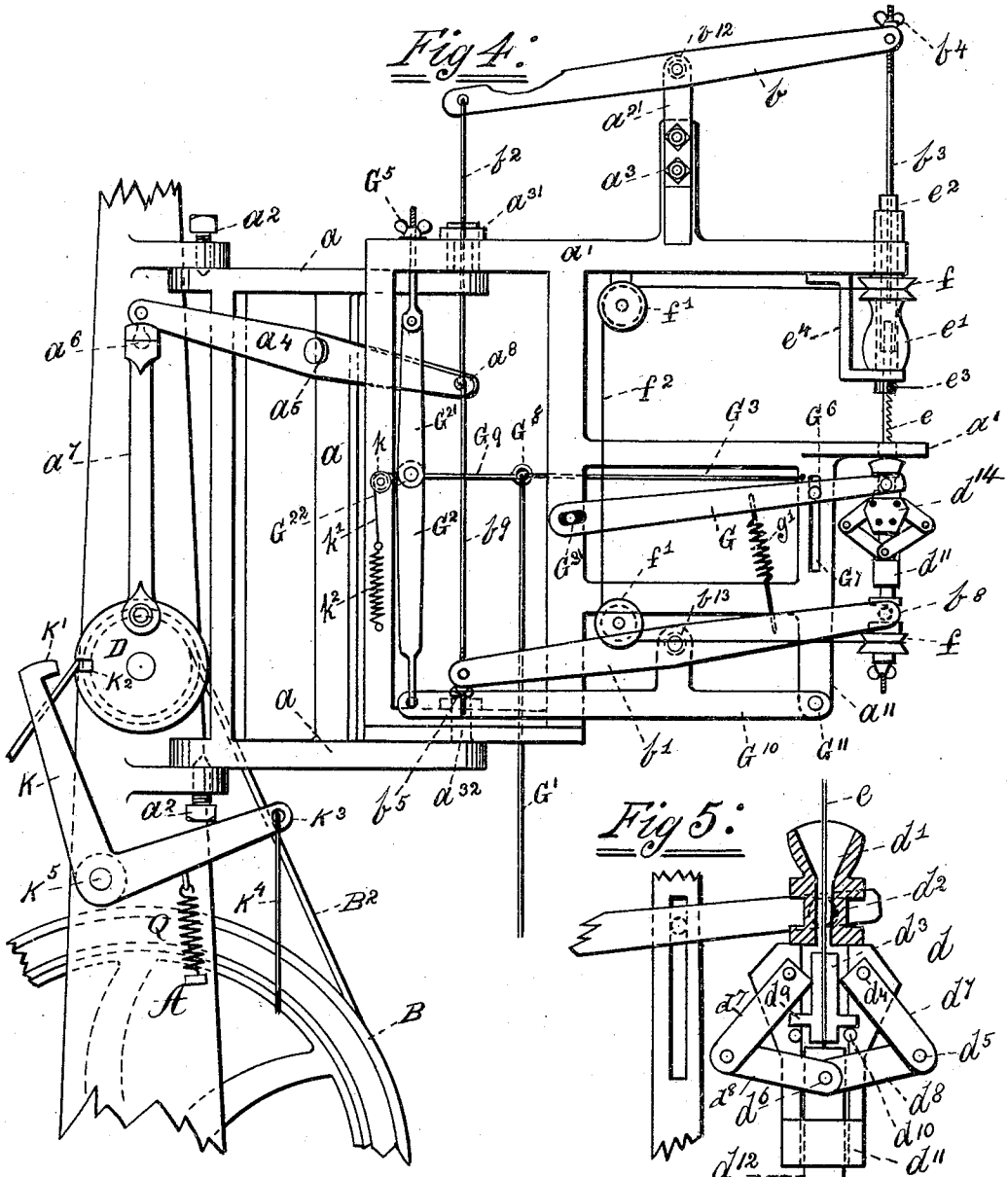


Fig 5.

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Fig 6.

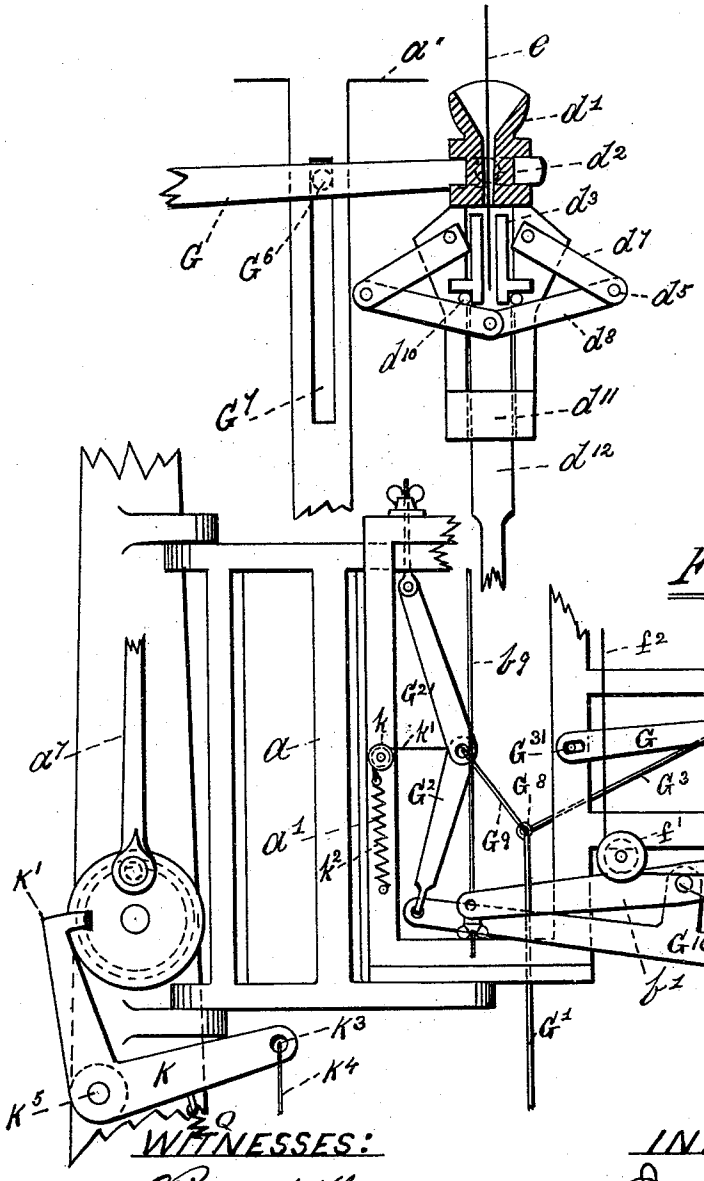


Fig 7.

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UNITED STATES PATENT OFFICE.

JAMES LAIRD, OF PATERSON, NEW JERSEY.

SCROLL-SAWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 444,071, dated January 6, 1891.

Application filed April 9, 1890. Serial No. 347,286. (No model.)

To all whom it may concern:

Be it known that I, JAMES LAIRD, of the city of Paterson, county of Passaic, and State of New Jersey, have invented a new and useful Improvement in Scroll-Sawing Machines, of which the following is a specification.

The object of my invention is to provide a scroll-sawing machine so constructed that the person operating the same may turn and guide the saw, moving it in any direction while sawing without moving the wood or other substance which is being sawed.

The invention consists of a main frame, a saw-frame, and an intermediate swinging frame connecting the two. One end of the intermediate frame swings on centers in lugs cast on the inner side of the main frame and on the other end of the intermediate frame are centers on which the saw-frame swings at right angles, a gripping device of peculiar construction for holding the saw, and a device for guiding the saw while in operation, all in combination with the series of levers, connecting-rods, hollow centers, ball-and-socket joint, treadle, driving-wheel, and pulleys, hereinafter more fully described and set forth.

In the accompanying drawings, in which similar letters of reference indicate like parts, Figure 1 is a side elevation of saw. Fig. 2 is a plan of same. Fig. 3 is a section detail of saw-connection. Fig. 4 is a part back view of frame. Fig. 5 is a detail part section of grip closed; Fig. 6, detail of grip, part section, open to release saw. Fig. 7 is a part elevation of back of frame, showing levers depressed, crank locked, &c., in releasing saw-blade.

A is a standard, pivoted to which at E is a treadle F, provided with pitman D^9, engaging at its other extremity a crank C in the usual manner. On the frame A is located in suitable bearings a shaft or arbor having a crank C on the inner end and on its outer end a band-wheel B, from which a band or cord B^2 is carried over the pulley B′, which is located on a similar arbor journaled on the standard A, and having at its inner end a crank-disk D, with similar crank, and is provided on its periphery with a notch K^2, which is made to correspond with the hook end K′ of the lever K. Lever K is secured loosely to the frame A in a suitable position by the pin K^5. The other end of the lever K at K^3 is connected by a rod K^4 to the treadle G^{30}, secured to the floor or other suitable location in the usual manner.

On the inner side of the standard A, and swinging on centers a^2 a^2, which are screwed into lugs cast on the standard A, is a frame *a*. On the other end of frame *a* are centers a^{31} and a^{32}, on which the saw-frame *a*′ swings at right angles to the frame *a*. (The relative positions of the frames *a* and *a*′ with the standard are better shown by Fig. 2.) On the frame *a* at a^5 is pivoted the rocking arm a^4, on the inner end of which is the ball-and-socket joint a^6, connecting with pitman a^7. The other end of pitman is connected by crank-pin with crank-disk D. The outer end of rocking arm a^4 is connected at a^8 with saw-arm *b* by the rod b^2, which works through the hollow centers a^{31}, and connected with the lower saw-arm *b*′ by the stiff rod b^9. Rod b^9 is connected to saw-arm *b*′ by a swivel-joint b^5.

G^{22} is a toggle-joint uniting the bar G^2, which is pivoted onto the end of the saw-straining lever G^{10}, and the bar G^{21}, which is jointed onto the thumb-screw G^5, by which to regulate the strain on the saw; but any amount of strain can be put on the saw by merely turning the thumb-screw G^5, which pushes down the straight toggle-bars G^2 and G^{21}, and through them acting on G^{10} and on both saw-arms and all the parts connecting them through pivot b^{13}. The rod G^3, fastened to the frame *a*′, the rod G^9, connected to the toggle-joint, and the rod G′ are all connected in a ring G^8.

k is a pulley, and k^2 is a spring to draw back to toggle-lever.

k′ is a cord connecting the toggle-joint with the spring k^2.

Rod G′ of straining device and rod K^4 of stop-lever K are both attached to treadle G^{30} for the purpose of stopping the machine and opening the grips to release the saw, as afterward described.

The saw-arm *b* at b^{12} is pivoted in the extension a^{21}, and fastened to frame *a*′ by set-screw a^3. The lower saw-arm *b*′ is pivoted at b^{13} to the straining-lever G^{10}, which is pivoted to frame *a*′ at G^{11}. Pivoted at G^{31} is a lever G, having an expansion-spring *g*′ acting be-

tween it and the lever b' so as to keep them forcibly apart. Lever G has also a pin at G^6 working in slotted guide G^7, and, being collared onto the neck of cup d', supports it and acts as vertical guide to saw e.

The end of saw-arm b' at b^8 is forked and incloses a collar swinging on pivots and through a hole in which the rod d^{12} turns, and on which is fixed the lower pulley f. The end of upper saw-arm b at b^4 is similarly provided with collar. The rod b^3 passes through collar on point of saw-arm b at b^4 and is then passed through a hole in a button or nut above the collar. Said button or nut is provided with a thumb-screw, by which it can be fastened at any distance up or down on rod b^3 to suit saws of different lengths. Rod b^3 can be pushed way up, so as to allow saw to be withdrawn from work. The lower end of rod b^3 is attached to upper saw cross-head e^2 at a point e^6. The saw e in lower end of cross-head is fixed by a set-screw e^5. The cross-head e^2, being round, slides freely up and down in guide-tube e^7, which has a slot going nearly its whole length to receive a feather e^8, fixed on cross-head e^2. The guide-tube e^7 turns freely in a round hole in saw-frame a', and also in one in bracket e^4, which is bolted on frame a'. The guide-tube e^7 has fixed to it a pointer e^3 to indicate the direction of cutting-face of saw.

The handle e', of which the pulley f is a part, fits easily into the space between the frame a' and the bracket e^4. Handle e' has a hole in it the whole of its length, into which is fitted the guide-tube e^7, both being temporarily fixed together by a pinch-screw through the handle e'. Now the saw e, being allowed free motion vertically, is carried around along with the handle e' and guide-tube e^7, in the slot of which the feather e^8 on cross-head e^2 slides lengthwise.

Figs. 5 and 6 show the grip or clamp d holding the lower end of saw e.

d^2 is the end of lever G, collared onto the neck of cup d'.

d^5 are pivots connecting levers d^7 with links d^8.

d^4 and d^9 are pivots riveted into the plate d, on which the levers d^7 work.

d^{10} are pins riveted into the plate d, on which the heels of steel jaws d^3 rest.

d^{11} is a sleeve connected with grip-plate d, and in which the rod d^{12} slides.

Fig. 5 shows the clamp or grip closed on jaw. Fig. 6 shows clamp or grip opened for the removal of saw.

The steel jaws d^3 rest loosely on the pins d^{10} and between the points of levers d^7, and are kept in their places by the cover d^{14}, Fig. 4.

Fig. 2 shows the relative position of the standard A with regard to the saw-frame $a\,a'$. By the side of saw-frame a' is a table H, on which to rest the board to be sawed. On the end of lever H^2 at H′ on the table H is a pad for holding down firmly the board to be sawed.

H^3 is fulcrum of lever H^2.

At H^4 is a hole in the table, through which passes a rod, connecting pad-lever with a spring fixed on the floor and operated by a hand-lever below the table.

Fig. 4 represents a and a' in position and the saw under strain.

We will now proceed to describe the method of removing and replacing the saw. The board to be sawed, having a hole pierced in one end of it, is now placed under the pad H′ of the table H, with the hole end projecting toward the saw. The sawyer now puts his foot on treadle G^{30}, to which is connected rod K^4 of stop-lever K and rod G′ of straining device, and the stop-lever K, the crank-disk D, the pitman a^7, the rocking lever a^4, the saw-arms $b\,b'$, the lever G, and the toggle-bars G^2 and G^{21}, with all their connections, are in positions prior to opening the grip and relieving the saw as represented in Fig. 4. The sawyer now pushes the treadle G^{30} down and everything assumes the positions shown in Fig. 7. The rod K^4 draws down the end of lever K at K^3, drawing the hook end of lever K at K′ into the notch K^2 of the crank-disk D, stopping the machine and holding it firm till the saw is withdrawn and replaced again. The treadle G^{30}, acting on rod G′, at the same time pulls down the ring G^8, attached to rods G^3 and G^9. The rod G^3, being fixed to saw-table a^5, draws the toggle-joint G^{22} inward and upward, and straining-lever G^{10}, being pivoted to saw-frame a' at G^{11} and at the other end of toggle-arm G^2, is also drawn up, raising with it the saw-arm b' by pivot b^{13}. The saw-arm b', being kept down by the stiff rod b^9, has all its upward motion thrown into the end b^8 of saw-arm b', which, being collared onto the neck of rod d^{12}, pushes it up through sleeve d^{11}, and, being by pivot d^6 connected to links d^8 and at d^5 to levers d^7, thereby pushes them back from jaws d^3. Jaws d^3 fall back on pins d^{10}, allowing the saw e to be withdrawn, which is done by taking hold of the rod b^3 with the hand and pushing it up through the collar at b^4 till the saw is clear of the work. The board to be sawed is now placed under the pad H′ on table H, with the hole end projecting toward the saw-table a^5, Fig. 2. Then taking hold of the handle e' with the finger and thumb swing the saw-table a^5 right under the board to be sawed with its hole right over the cup d', Fig. 5. Then take hold of the saw-blade and drop it into the hole in the board and into the cup, which will lead it in between the jaws of the grip, Fig. 6. The foot is now to be removed from the treadle G^{30}, Fig. 1, when the spiral spring Q on stop-lever K will disengage it from notch K^2 on the disk D, as will also the spring k^2 on frame a', acting over pulley k, draw the toggle-bars back into their upright position, pushing down straining-lever G^{10}, which, acting on saw-arm b' through pivot b^{13}, draws down the end of saw-arm b' at b^8, and with it the rod d^{12}, which, sliding in sleeve d^{11} on grip-plate d, and being pivoted at d^6 to

links d^8 and to levers d^7 by pivot d^5, closes the jaws d^3 on saw-blade e, as seen in Fig. 5. The pulley f on handle e', Fig. 4, is exactly the same size as pulley f on spindle of saw, and they are connected by an endless cord or chain f^2, passing over idle-pulleys f' f', fixed on frame a' and crossed between the upper or lower pulleys or behind pulleys, so as to turn the saw at both ends in the same direction without twisting the saw-blade. The compressed spring g', connecting the saw-arm b' with the lever G, acting forcibly between the supporting-neck of cup till the descending saw-arm b' at b^8 draws down the rod d^{12}, closing the jaws of grip on saw. The use of the lever G and the spring g' is better illustrated by supposing the spring g' to be taken out. The lever G would then have nothing to support it, and, being collared onto neck of cup, would of its own weight fall down, carrying with it the cup and the body of grip. This would relieve the jaws d^3 from the pressure of the levers d^7 and slacken their grip on the saw. This state of things would remain till lever G was again pushed up and its supporting-spring g' replaced. The saw being passed through the board into the grip and fastened at both ends, the sawyer, taking hold of handle e' with his finger and thumb, can turn the cutting-face of saw in any direction, and by the swinging frames a and a' and by leading the saw can cut any figure with the greatest ease and about three times quicker than with any other saw with which I am acquainted. This saw works easily and with very little noise, having no springs on saw-arms to overcome and very few joints that will ever require adjusting. It can be driven at great speed, and the saw can be replaced and removed in a few seconds.

Any kind of power may be employed to operate my scroll-saw and a board of any length may be sawed, and the width of the range of the saw in all cases is equal to the length of the intermediate swinging frame, backward or forward, on which the saw-frame swings.

Fig. 1 of the drawings, which form a part of my specification, shows a drilling or boring device on the same arbor or shaft that carries the disk D, and by the side of the pulley B′ is a larger pulley, which is grooved also, and is connected with a band or cord D^2 to a small pulley D′, which, with the pulley D^3, is located on an arbor journaled in the upper part of the frame A. On the same arbor is loosely balanced an arm D^4, provided with a drill-spindle D^7, pulley D^5, bands D^8, and an operating-handle D^6.

With this description of my invention, what I claim is—

1. In a scroll-sawing machine, the combination of frames, a primary frame A, fixed, from which motion is conveyed to an intermediary swinging frame a and thence to a swinging frame a', carrying the saw, the last-mentioned two frames swinging on the centers a^2, a^2, a^{31}, and a^{32}, (solid,) in combination with the endless cord or chain f^2, passing around pulleys f f and f' f', for the purpose of guiding and, in conjunction with the handle e', of turning the saw and enabling the person operating the saw to cut any desired figure without moving the board or other material which is being cut or sawed, the whole being constructed substantially as shown and described, for the purposes set forth.

2. The combination of the frames A, a, and a', the grip d, lever G, the toggle-straining levers G^2 and G^{21}, acting on the shank of the grip through the lever G^{10}, which again acts on lower saw-arm b', loosening the grip on the saw to permit its withdrawal from or insertion into the grip in conjunction with the driving mechanism, all constructed substantially as described, and for the purposes specified.

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