4 Sheets—Sheet 1.

C. STENGEL.

Dovetailing-Machine.

No. 211,531. Patented Jan. 21, 1879.

Fig. 1.

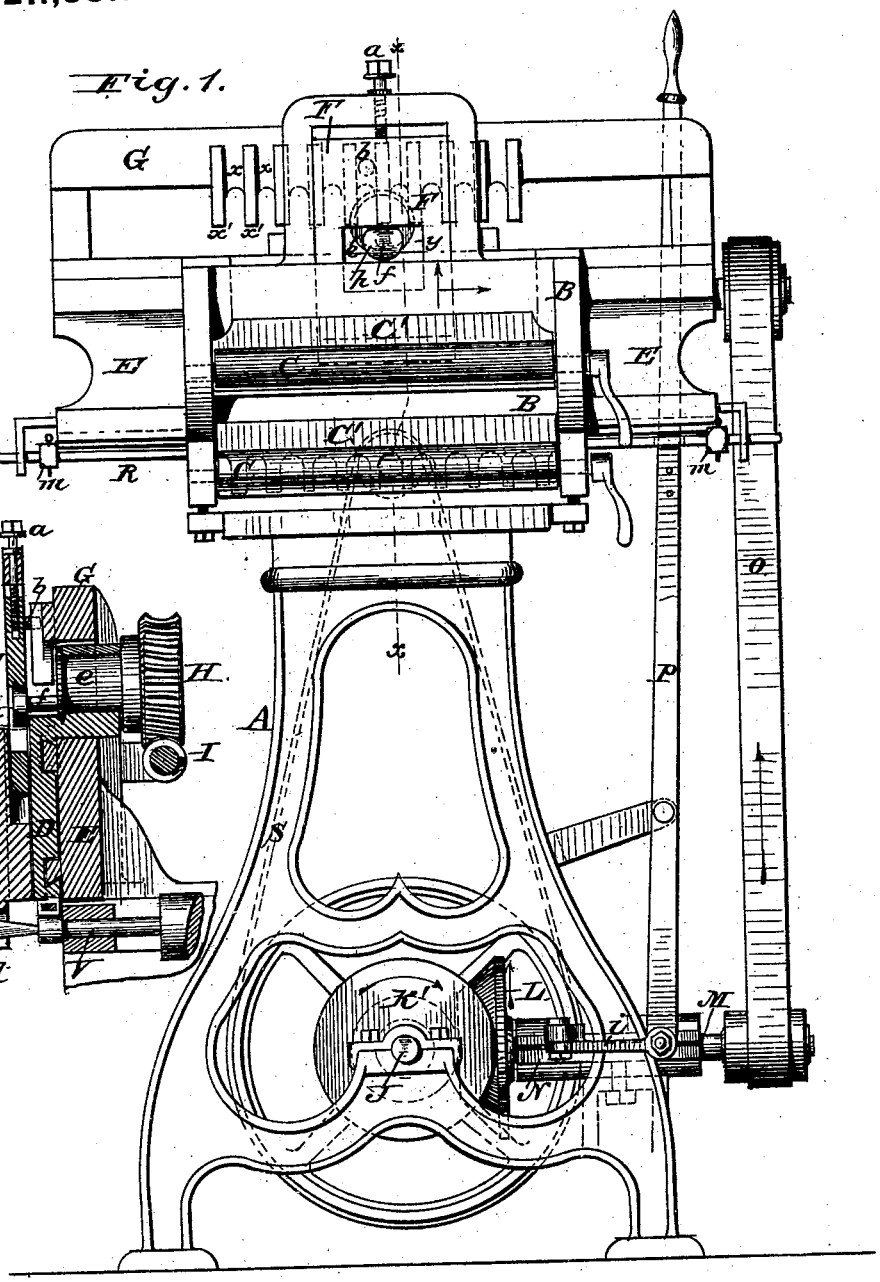
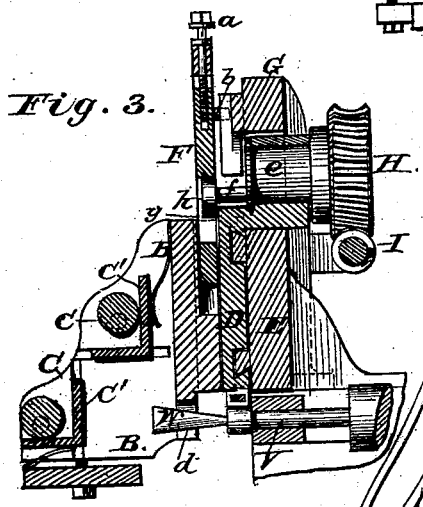


Fig. 3.



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Chas. F. Steele

Inventor:
Charles Stengel
by his attorney
C. F. Gibb

4 Sheets—Sheet 2.

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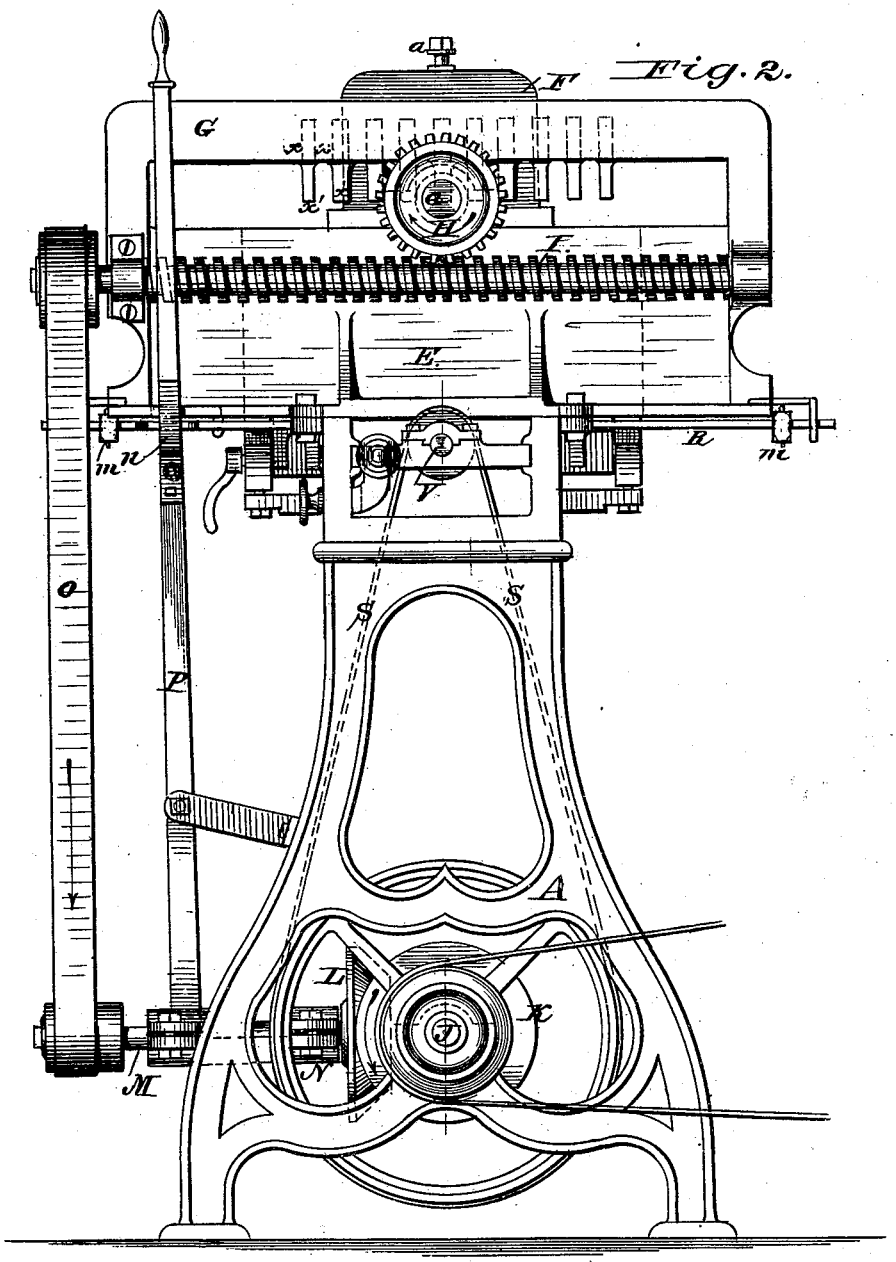
Dovetailing-Machine.

No. 211,531. Patented Jan. 21, 1879.

Fig. 2.



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Dyer & Bill

4 Sheets—Sheet 3.

C. STENGEL.

Dovetailing-Machine.

No. 211,531. Patented Jan. 21, 1879.

Fig. 4.

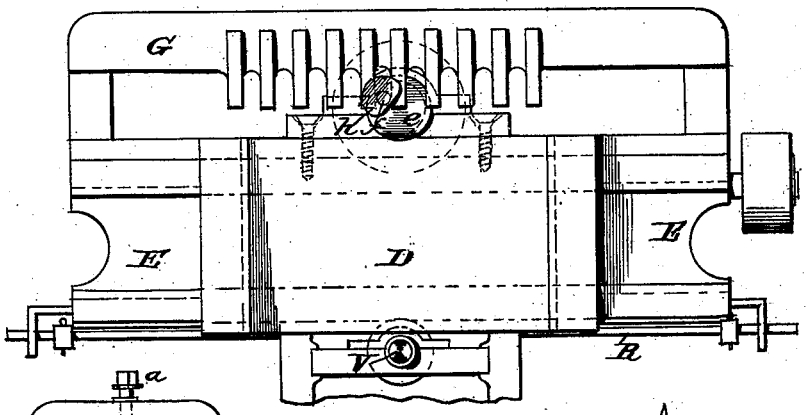


Fig. 5.

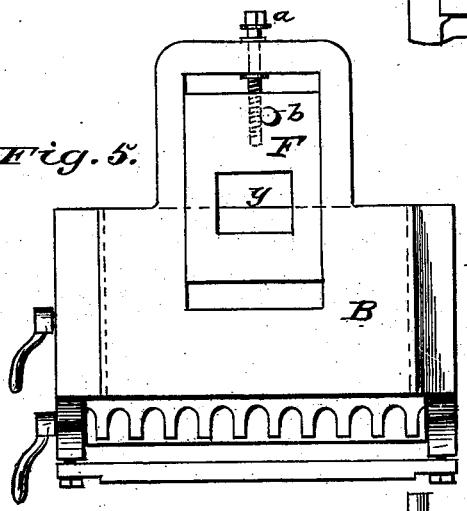


Fig. 6.

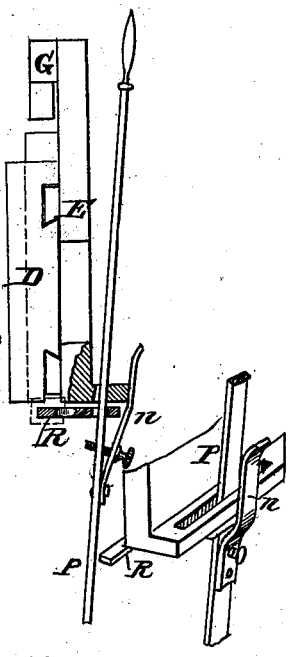


Fig. 8.

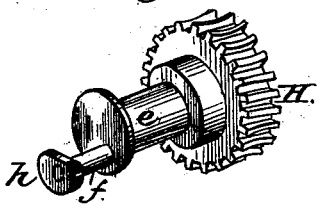
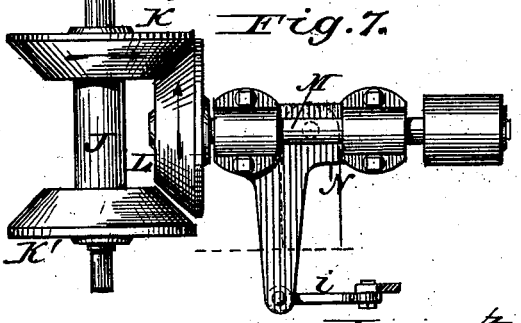


Fig. 7.



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C. H. Bills

4 Sheets—Sheet 4.

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Dovetailing-Machine.

No. 211,531. Patented Jan. 21, 1879.

Fig. 9.

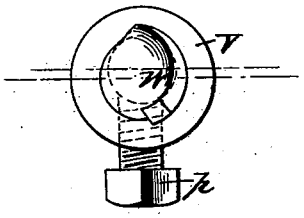


Fig. 10.

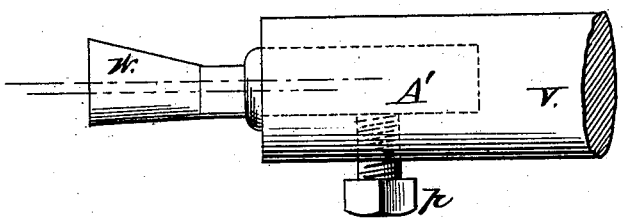


Fig. 11.

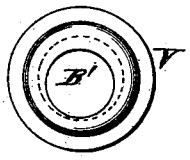


Fig. 12.

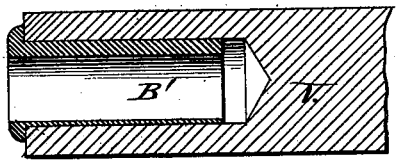


Fig. 13.

Fig. 14.

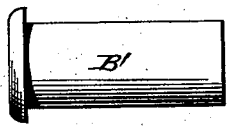


Fig. 15.

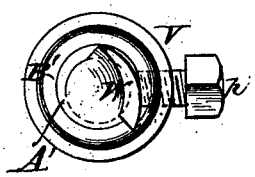
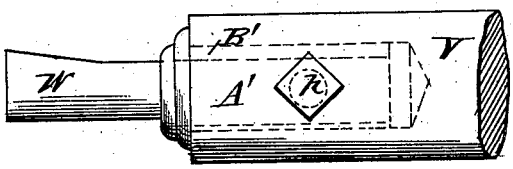


Fig. 16.



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Inventor:
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by his attorney
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UNITED STATES PATENT OFFICE.

CHARLES STENGEL, OF HAMILTON, ASSIGNOR TO J. A. FAY & CO., OF CINCINNATI, OHIO.

IMPROVEMENT IN DOVETAILING-MACHINES.

Specification forming part of Letters Patent No. **211,531**, dated January 21, 1879; application filed November 22, 1878.

To all whom it may concern:

Be it known that I, CHARLES STENGEL, of Hamilton, in the county of Butler and State of Ohio, have invented certain new and useful Improvements in Dovetailing-Machines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

My invention relates to that class of machines which are adapted for forming dovetail joints in wood-work by means of rotary cutters, and more especially to such machines as are constructed to automatically round one side of the dovetailed tenons on one of the two boards or pieces of lumber operated upon, so that said rounded side of the tenons may make a close-fitting joint with the necessarily-rounded ends of the dovetailed mortises in the other board or piece of lumber.

My invention consists in the construction and arrangement of devices for automatically traversing the lumber-carriage across the rotary cutter; also, in so constructing the machine that joints may be formed during both the forward and backward movement of the carriage; also, in the construction and mounting of the cutter, and in the construction and combination of other parts, as will be hereinafter more fully set forth, and pointed out specifically in the claims.

In the annexed drawings, Figure 1 is a front elevation of a dovetailing-machine embodying my invention. Fig. 2 is a rear elevation of the same. Fig. 3 is a transverse vertical section thereof on the line *x x*, Fig. 1. Figs. 4 to 8 are detail views of different parts of the machine. Figs. 9 to 16 are detail views, showing the construction and mode of mounting of the cutter.

I have illustrated my invention in connection with a dovetailing-machine, which operates with a single rotary cutter, shown, for instance, in my United States Letters Patent No. 183,030. It is obvious, however, that my invention may be embodied in machines of the character shown in my United States Letters Patent No. 199,117, as well as in other kinds of dovetailing-machines.

A represents the frame of my machine. B is the lumber-carriage, provided with the clamping-rollers C C, operating on angle-plates C′ C′, for holding the two pieces of lumber to be operated upon, one piece being held in a horizontal and the other in a vertical position. The carriage B is movable up and down in dovetailed guides on an intermediate traveling plate, D, and this traveling plate is movable horizontally upon suitable ways on a saddle, E, attached to the main frame of the machine. The carriage B is provided with a slotted yoke, F, which may be adjusted up and down by means of a set-screw, *a*, or in any other suitable manner, for the purpose of regulating the up-and-down movement of the carriage. This yoke F is provided with a fixed pin or guide, *b*, entering the vertical grooves *x* between the ribs *x′* on the fixed plate G, said guide-pin fitting the grooves so snugly that it has no lateral play therein. The ribs *x′* extend below the lower edge of plate G, forming a comb. The vertical side of the lumber-carriage is provided with the comb *d*, to allow the cutting-tool to pass through between the teeth thereof into the lumber.

The carriage is moved automatically by the following means: Upon the traveling plate D is attached a bearing for the journal *e* of a worm-gear, H, which meshes with a worm-screw, I, arranged in bearings back of and parallel with the plate E. The journal *e* is, at its forward end, provided with a crank-pin, *f*, having a cam, *h*, on its end, which cam enters the slot *y* in the yoke F of the lumber-carriage, while the crank-pin *f* at times enters between the ribs *x′* of plate G, its throw being equal to the distance between two adjacent grooves, *x*.

The effect of this mechanism on the lumber-carriage is modified by the ribbed plate G and the fixed guide-pin *b* on the yoke F, and the conjoined operation of all of this set of devices may be set forth briefly thus: Take the position of the parts shown in Fig. 1, the carriage having arrived at the lowest point of its descent, and, consequently, the cutting of two

corresponding mortises having just been completed. The yoke F of the lumber-carriage rests on the flat side of cam *h*, the crank-pin is below and free from the ribs *x'*, while the guide-pin *b* of the yoke F is between two ribs, *x'*, of plate G. Now, let the journal *e* be turned in the direction of the arrow, (see Fig. 1,) cam *h* will at once operate on yoke F, and begin to elevate the carriage, whereby guide-pin *b* is also elevated. By the time guide-pin *b* reaches the upper extremity of the groove *x*, in which it travels for the time being, crank-pin *f* enters the next adjacent groove *x*. At this point of time the carriage will have ascended so far as to have withdrawn the vertical piece of lumber entirely and the horizontal piece of lumber partly from rotary cutter W. As journal *e* continues to turn, its crank-pin *f* becomes engaged between the ribs of the groove *x* adjacent to the groove which guide-pin *b* is just leaving at the upper end, and a compound movement is now imparted to the lumber-carriage—namely, cam *h* continues to elevate it, while crank-pin *f* (which, in consequence of its engagement in the plate or rack G, causes a traversing or traveling motion of journal *e*) draws it in a horizontal direction. The throw of crank-pin *f* is exactly the same as the throw of cam *h*, and the cam is so formed that this combined action of the crank-pin and cam results in moving the lumber-carriage in the arc of a circle, the center of which is in a plane midway between the groove, *x*, just left by guide-pin *b* and the adjacent groove, between the downwardly-projecting ribs *x'* of which crank-pin *f* is operating. The axis of journal *e* is on the line of the lower ends of ribs *x'*, so that the crank-pin *f* makes one-half of a revolution from the time of entering between to the time of escaping from any two ribs *x'*. Hence, in moving the lumber-carriage from groove to groove of plate G, the traverse of any point of such carriage is semicircular, in consequence of which the rotary cutter W will cut a semicircular rounding upon the lower side of the horizontal piece of lumber in shifting the carriage from groove to groove. In other words, one side of the tenons of the horizontal piece of lumber will be rounded to fit the rounded inner end of the mortises cut in the vertical piece of lumber.

In the lower part of the frame A is a horizontal shaft, J, to which motion is communicated by belt or otherwise from the line-shaft, and upon this shaft J are secured two beveled friction-gears, K K'. Between these friction-gears is a single friction-gear, L, secured upon a shaft, M, which has its bearings in a swinging or pivoted box, N, so that the gear L may be thrown in contact with either of the gears K and K', and driven thereby alternately in one direction and the other. Upon the other end of the shaft M is a pulley, connected by belt O with a pulley on the end of the screw I.

The pivoted box N is provided with an arm, which is connected by a rod, *i*, with the lower end of the pivoted shipper-lever P for swinging the box N. Below the plate E is a rod, R, running parallel therewith, and provided near each end with an adjustable collar or tappet, *m*. The lever P passes through an eye of a projection on the rod R, as shown fully in Fig. 6, and as the lever is moved one way or the other it moves the rod, and vice versa. The shipper-lever also passes up through a loop on the frame, and is firmly clamped to the loop-bar by a spring, *n*, with sufficient friction to overbalance the tendency of the friction-gears K or K' to move the friction-gear L out of frictional contact when driven by either of them.

Now, as the carriage moves to one end it strikes the tappet *m*, moving the rod R and also the shipper-lever P, thereby disengaging the friction, so as to stop the feed. The operator then removes the two finished pieces of lumber and puts in two fresh pieces. He then ships the lever P still farther than the lumber-carriage shipped it, so as to force gear L into frictional contact with the other friction-gear on shaft J. This again starts the operation of the machine, the traverse of the carriage being now in a reverse direction, however. After rounding the last tenon the carriage again stops the machine by striking the tappet on the other end of rod R, when fresh pieces are again put in and the feed reversed again.

The carriage always stops at the extreme upward throw of the crank and at the extreme right or left hand end of the series of grooves *x* of plate or rack G.

By this construction of devices joints are formed both during the forward and the backward movement of the carriage, whereas in machines of this character it has heretofore been necessary to return the carriage by hand back to the starting-point, and joints could only be formed while the carriage was traveling in one direction.

From a pulley on the shaft J a belt, S, connects with a pulley on the mandrel V, which carries and drives the bit or cutting-tool W. The mandrel V is bored out eccentrically from the end to receive the shank A' of the cutter W, which shank is also turned eccentric to the end of the cutter. On account of this double eccentricity, the cutter can easily be adjusted to cut larger or smaller, as desired, by simply turning the cutter in the mandrel, and the cutter is held in any position by a set-screw, *p*, or other suitable means.

Instead of having the hole in the mandrel bored eccentric, it may be bored concentric, and an eccentric thimble, B', inserted therein to match the eccentric shank of the cutter.

The use of a concentrically-bored mandrel provided with an eccentrically-bored thimble for the reception of the eccentrically-shanked cutter possesses several advantages over the eccentrically-bored mandrel. For instance, this part of my invention can in that form be readily applied to existing machines. Again, in case the mandrel were sprung by overstrain and required to be trued up in a lathe,

it could be much more easily centered than an eccentrically-bored mandrel. This feature of eccentricity of the cutter and mandrel-chuck is applicable to routing and other cutting tools.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a dovetailing-machine, a lumber-carriage operating automatically up and down and backward and forward by means of a traveling crank and reversible feed device, whereby joints may be formed during both the forward and backward movement, the whole constructed substantially as herein set forth.

2. The combination, substantially as before set forth, of the lumber-carriage provided with a guide-pin, the rack for controlling the movements of the carriage, and the traveling connected cam and crank-pin for moving the carriage.

3. The combination, substantially as before set forth, of the lumber-carriage provided with a guide-pin, the rack for controlling the movements of the carriage, the traveling connected cam and crank-pin for moving the carriage, and the reversible feed-gearing.

4. The combination of a mandrel having an eccentric tool-socket and a cutting-tool provided with an eccentric shank, as herein set forth.

5. The combination of a concentrically-bored mandrel, an eccentric sleeve or thimble inserted therein, and a cutting-tool provided with an eccentric shank, substantially as herein set forth.

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

CHARLES STENGEL.

Witnesses:

JOS. C. NOYES,

CHAS. C. DAVIS.