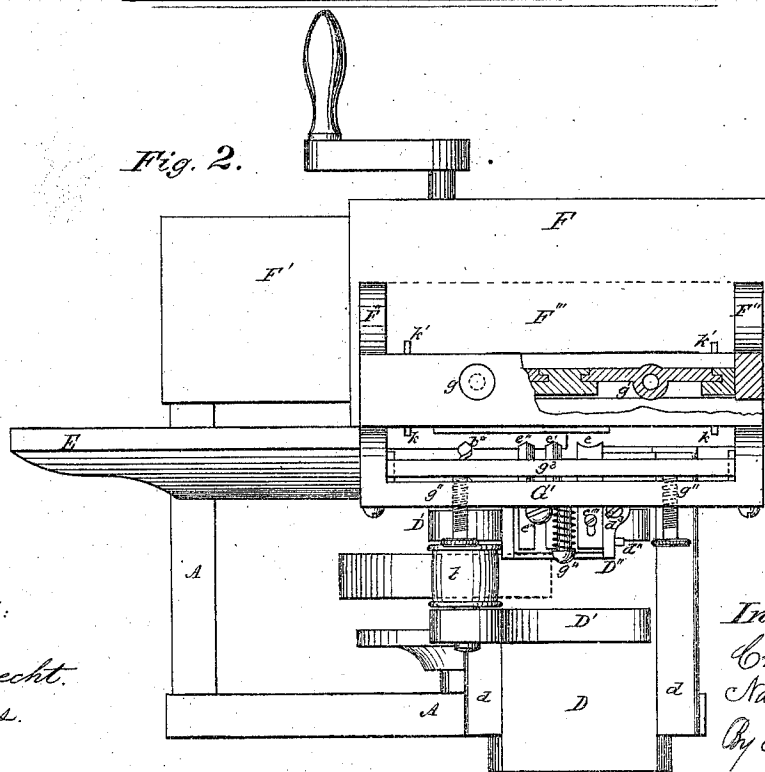
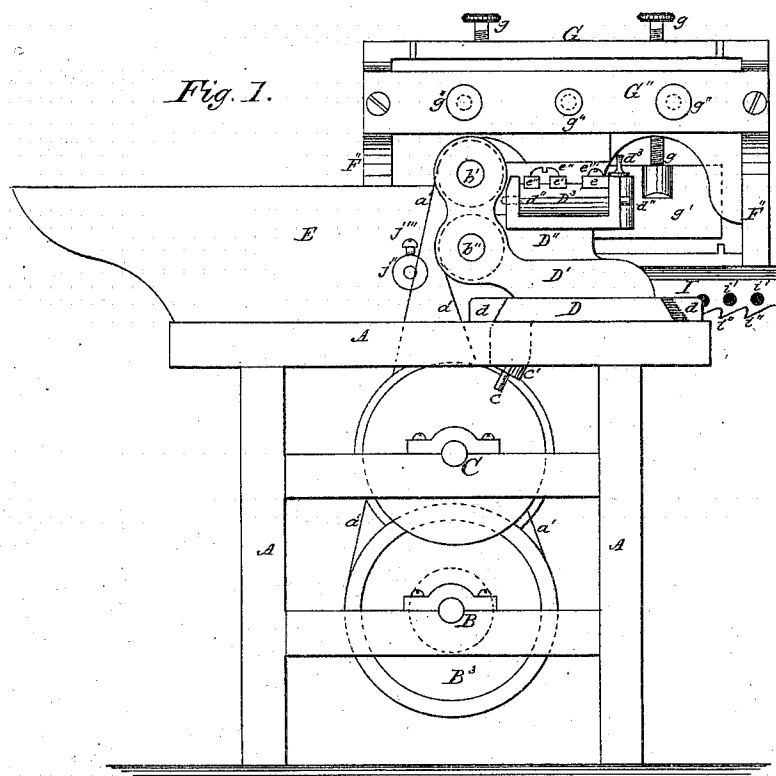


C. B. KNAPP & N. S. CLEMENT.

Improvement in Machines for Dovetailing.

No. 122,390.

Patented Jan. 2, 1872.



Witnesses:

J. C. Brecht.
G. J. Noyes.

Inventor:

Charles B. Knapp
Nathan S. Clement
By H. Crawford
att'y.

C. B. KNAPP & N. S. CLEMENT.

Improvement in Machines for Dovetailing.

No. 122,390.

Patented Jan. 2, 1872.

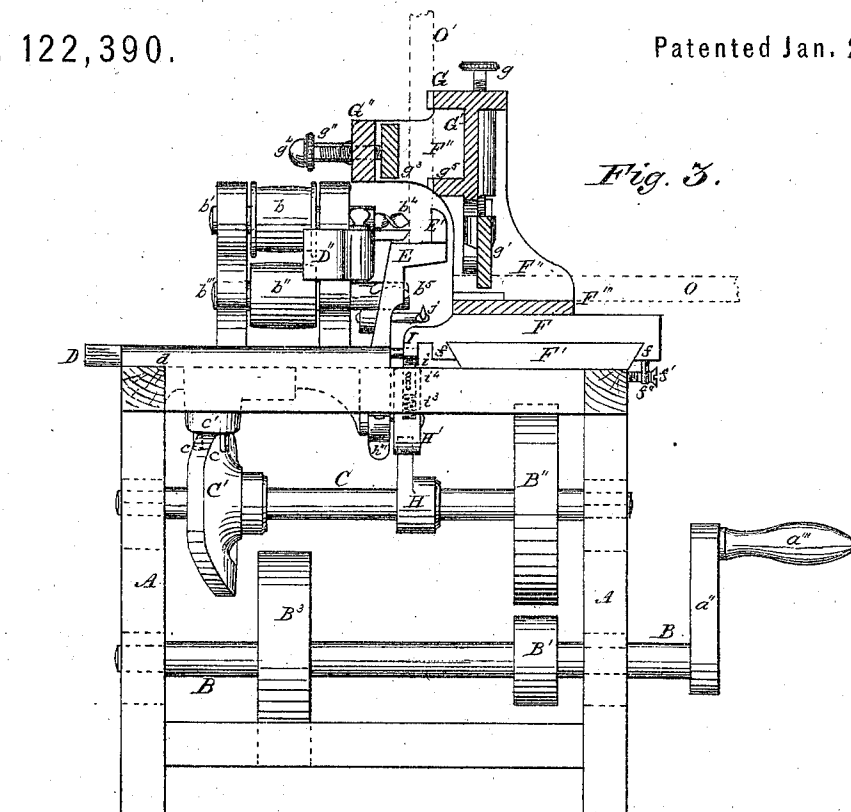


Fig. 3.

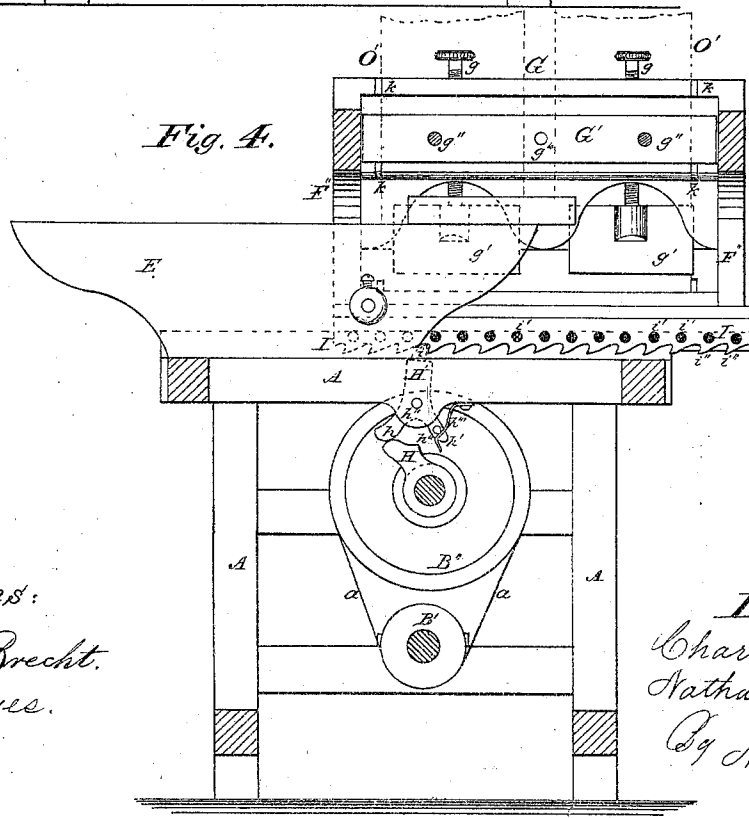


Fig. 4.

Witnesses:

T. C. Brecht.
S. J. Hayes.

Inventor:

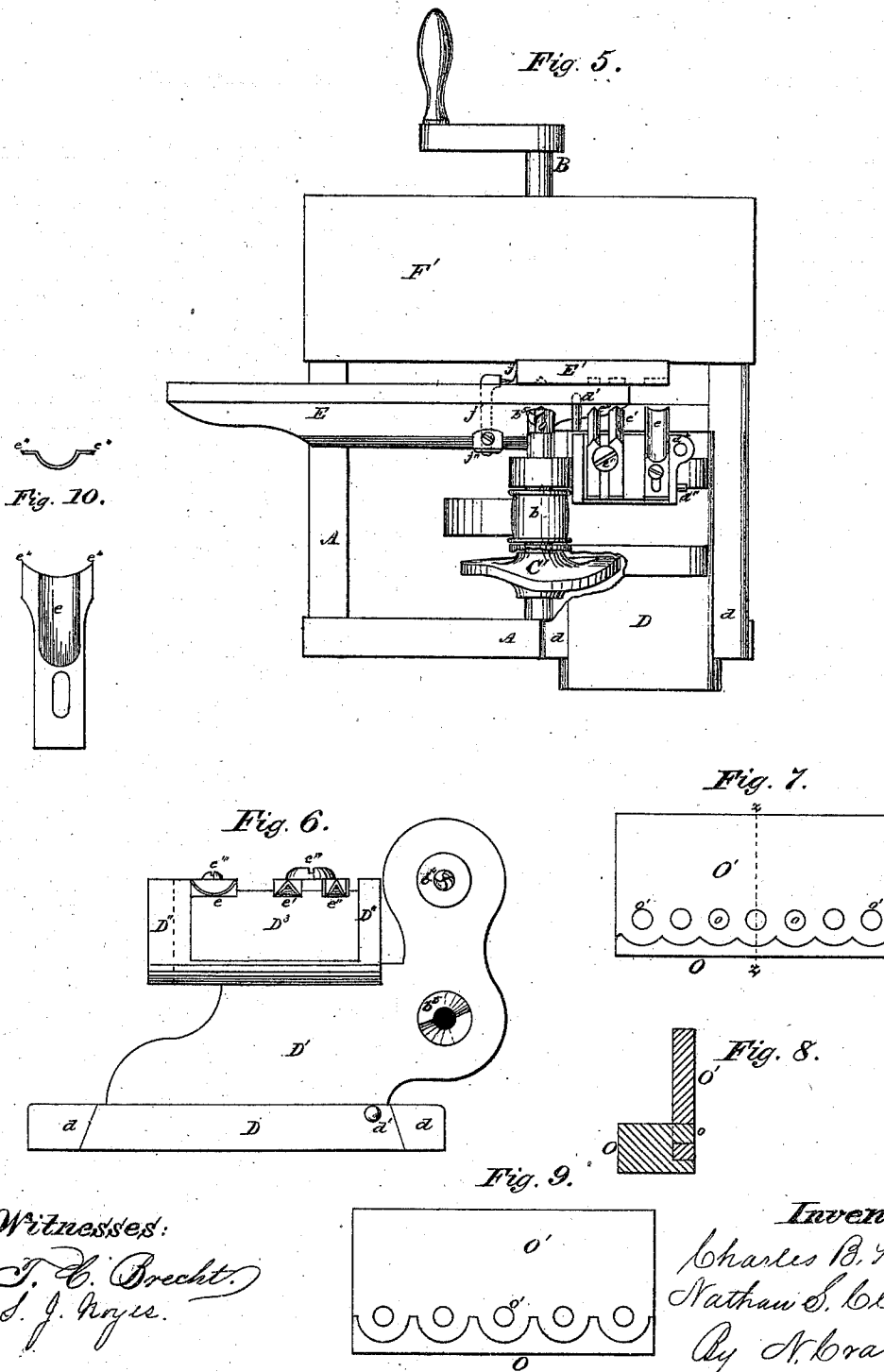
Charles B. Knapp
Nathan S. Clement
By N. Cranford a

C. B. KNAPP & N. S. CLEMENT.

Improvement in Machines for Dovetailing.

No. 122,390.

Patented Jan. 2, 1872.



Witnesses:

T. C. Brecht.
S. J. Hayes.

Inventor:

Charles B. Knapp
Nathan S. Clement
By A. Bradford atty.

UNITED STATES PATENT OFFICE.

CHARLES B. KNAPP, OF WATERLOO, WISCONSIN, AND NATHAN S. CLEMENT, OF NORTHAMPTON, MASSACHUSETTS, ASSIGNORS TO KNAPP DOVETAILING-MACHINE COMPANY OF NORTHAMPTON, MASS.

IMPROVEMENT IN MACHINES FOR DOVETAILING.

Specification forming part of Letters Patent No. 122,390, dated January 2, 1872.

We, CHARLES B. KNAPP, of Waterloo, in the county of Jefferson, in the State of Wisconsin, and NATHAN S. CLEMENT, of Northampton, in the county of Hampshire, in the State of Massachusetts, have made certain Improvements in Machines for Dovetailing, of which the following is a specification:

The object of this invention is to improve the machine patented April 2, 1867, to CHARLES B. KNAPP, and to more successfully make the joint in wood as patented by the said CHARLES B. KNAPP as a design August 23, 1870, as well as others of a similar configuration and design; and it consists in the construction of some of the parts and their arrangement and combination with others forming the operating parts of the machine by which the work is performed, as is more fully hereinafter described.

In the drawing, Figure 1 represents an end view of the machine; Fig. 2, a top view, with parts broken away to show others; Fig. 3, a side view partly in section; Fig. 4, an upright section; Fig. 5, a top view, with a portion of Fig. 2 removed; Fig. 6, a detached view of the boring and cutting devices and carriage; Fig. 7, the joint, as made; Fig. 8, a section of Fig. 7 in line *z z*; Fig. 9, a modification of the joint shown in Fig. 7; and Fig. 10 is a modification of the cutting chisel to make the joint, represented in Fig. 9.

A A represent the framing which supports the operating parts of the machine. B is the longitudinal driving-shaft, journaled in boxes or bearings on the framing A. B' is a band-pulley fast on shaft B, and revolves with it, and is of small diameter. B'' is a band-pulley fast on shaft C, and is revolved by belt or band *a* passing around pulley B' on shaft B, and over pulley B''. B³ is a band-pulley fast on shaft B. C is a horizontal shaft journaled to revolve freely in bearings vertically over shaft B and attached to framing A. C' is a cam-wheel made fast on and revolves with shaft C, and has bearing faces on its sides, and near its rim or periphery is purposely irregular in form on such faces in order to time the reciprocations of what bears upon such faces and is moved by them to the proper distance horizontally in either direction. D is a reciproca-

ting tool carriage, sliding horizontally in either direction between guide-ways *d d*, between which it is nicely adjusted, and so that it will not vary laterally in its reciprocations. On the under side of this reciprocating carriage is a guide-post support, *c'*, in which are the two guide-posts *c c* projecting downward and parallel with each other, and of just the distance apart to admit the edge of the irregular or crooked faced cam-wheel C' to go between them and have little or no play. These posts *c* may be, and are in practice, adjustable with relation to the carriage D, so as to adjust the extent of the horizontal movement of the carriage to just move so far and no further. D¹ D¹ are two supports or head-blocks on the top side of carriage D, and between which revolve pulleys *b* and *b''* on arbors *b'* and *b'''*, that are journaled and revolve in proper bearings in said head-blocks D¹. Pulleys *b* and *b''* are revolved by belt *a'* around pulley B³ on shaft B over pulley *b*, against and partly over pulley *b''*, as seen in Fig. 1. *b⁴* is a boring bit or auger centered and secured in arbor *b'*, and is revolved by and with it, and is so constructed that its projection can be adjusted in the arbor. *b⁵* is a hollow or center core auger; is centered and secured in arbor *b'''*, and is revolved by and with it, and can be adjusted in said arbor *b'''*, as to its projection horizontally from the inner end of said arbor *b'''*. D'' is a cutter-block holder, and is attached to the inner one of and reciprocates with the head-blocks D'' D'', and has a bottom and two sides, but is open to receive the cutter-block D³. D³ is the tool or cutter-block, and is made to fit in its holder D'' and to turn up in one direction by means of journals *d''* passing through the sides of holder D'' and into the block D³, and so that the cutting tools can be turned to a perpendicular position. *d³* is a thumb-screw turn-button, turned into hold *d⁴* in holder D'' for holding the cutter-block D³ down to its place in the holder D'', having its projecting flange under the head cut off on one side so as to release the cutter-block when necessary to turn it up, and by turning it partly around the flange will project over the block and hold it from turning. By this construction of holder and

cutter-block the tools or cutters can be turned up and in such position that the cutters can be sharpened without taking them out of their stock, thus saving time by not having to readjust them to their proper position for cutting. d' is a holding pin on the inner end of carriage D, and holds the stock carriage in place while the tools in block D³ and on arbors in supports D' on carriage D are being reciprocated to do their work on the stock to be wrought. e , e' , and e'' are cutters placed in and are attached to and reciprocate with block D³. Cutters e' and e'' are V-shaped and are held in place by holding screw e'' passing between their shanks and screwing into block D³. The flanged or enlarged head projects to bear upon the cutters and hold them as they are adjusted, while screw e'' goes through a slot in the shank of the circular cutter e and screws into block D³, and bears upon and holds the cutter in place. E is a rest for the support of that part of the stock that stands vertically in the machine while being operated upon by the reciprocating tools, and has a block, E', attached to the rear side and rising higher than the top of rest E, and against which the back of the stock or stuff being wrought bears, and is held while the tools are acting to cut the joints in such stuff, and so that no splinters will be formed on the stuff as the tools bore or cut completely through the stuff and enter this bearing-block, thus insuring a clean cut on the ends of the stuff so wrought upon. F is a sliding stock carriage made to slide upon the slide-way F' that is fast upon the framing A—is wider on its top side than on the bottom, so that the flanges $f f$ on carriage F will fit upon their dovetail edges, but be free to reciprocate thereon but cannot rise from the slide-way F', as is seen in Fig. 3. Upon the side of carriage F, that is toward reciprocating carriage D and its bottom edge, is attached a toothed rack, I, with teeth $i' i'$, of the same exact size or the same distance from point to point, on its lower edge, and has holes $i' i'$ transversely through the rack, and as many of them as there are notches or teeth in the rack, and so made as to receive the holding-pin d' that is on the inner end of tool carriage D', whenever said tool carriage is reciprocated toward the rack and is forced forward in the revolution of the cam-wheel C'. F'' F'' are uprights raised upon carriage F to support the clamps that hold the stock or stuff in position to be wrought. F''' is a bearing face-plate between the uprights F'', upon which the stuff that is wrought while in a horizontal position and upon its ends is placed and firmly held. G is the top piece of a clamp to hold the horizontal stock firmly in position while being operated upon. G' is a vertical support to G as well as a lateral support to the uprights F'', between which it fits. $g g$ are clamp-screws passing through top piece G and through vertical projections in support G', in which are nuts, and are made fast at their lower ends in the sliding clamp-jaws $g' g'$, and by turning the screws the clamp-jaws

are raised or lowered depending upon the direction that they are turned. G'' is the face piece of the clamp that holds the perpendicular or upright pieces to be wrought. $g'' g''$ are clamp-screws passing through screw-holes in face piece G'' and into or against clamp-jaw g^3 , which by turning screws g'' the clamp-jaw will be forced toward the top piece G and projecting plate g^5 , and holding the upright piece or pieces to be wrought upon firmly between the clamp-jaw g^3 and the edges of top piece G and plate g^5 , which edges are on or nearly on a perpendicular line, are dressed to be true and straight to give the proper position to the piece or pieces to be held in place and wrought upon. g^4 is a stud passing and sliding through face-plate G'', and secured in the jaw g^3 with a spiral spring coiled around between its head and face-plate to cause the jaw to recede when the screws g'' are released. The standing parts forming these two clamps, instead of being formed in as many specific parts as above described, may be cast in one piece of metal, as they are in practice, and the moving parts adapted to be used with such condition. $k k$ are projecting stops on the face edge of piece G and on the face edge of plate g^5 , against which the work edge of the stuff to be wrought bears, and the two stops, one above the other, form a guide to easily adjust the stuff in the upright clamp. $k' k'$ are similar projecting stops on face-plate F''', and for a similar purpose of guiding and holding the stuff in the right place for the operating tools to commence their work at the proper distance from the work edge and finish up at the same distance from the opposite edges. H is a projecting revolving cam made fast upon shaft C and revolves therewith, and is in or nearly in the form seen in Figs. 3 and 4. H' is a bifurcated lever pivoted at h'' to frame A, and upon which it vibrates, and below which pivotal point the two legs h and h' separate in opposite directions, and are of nearly the same length. On one side of leg h' projects a pin, h^4 , against which bears a spring, h''' , which keeps the lever in the position to be operated upon by the cam H. In the top of this bifurcated lever is a mortise to receive the shank of a spring pawl or catch, i ; around the said shank is a spiral spring that bears upon the bottom of the mortise and against a pin that goes transversely through the shank of catch i , and works in slots that go transversely through the lever H' near its upper end, which has the effect to keep the catch or pawl i extended to the point where the pin through the shank of the pawl or catch strikes through the upper ends of the slot in lever H', where it remains unless forced back by the vibration of the lever and causing the inclined side of the pawl to strike against and slide on the inclined side of a tooth in the rack until it passes the point of said tooth, when the spring will force the catch into contact with the next notch, and, as the cam H vibrates the lever H' with the catch in the notch, the rack, and the stock carriage are advanced to

the extent of a notch in the rack. *j* is a gauge-point for marking on the under side of the stuff that lies in a horizontal position the depth that the hollow auger *b*⁵ may cut into the end of the stuff, and prevent any splinter or tearing of the fiber of the wood beyond the gauge-mark made by the point *j*, which is made to project to nearly at a right angle with its arbor or shank *j* that goes through and is journaled in rest *E*, and is held to any adjustment either in projection or depth of penetration in the wood in making its mark.

Fig. 7 shows the form of joint made by the machine as applied to a drawer, *O*, representing the front of the drawer and presenting in the figure an end view, *o* being the pins left by the hollow auger *b*⁵, and all the rest of the wood within the scallop or circular lines being cut completely away by the said hollow auger to the depth of the thickness of the sides or runners of the draw *O'* having holes *o'*, or to the gauge-mark made by the point *j*. The end pieces or runners *O'* have holes *o'* bored by bit *b*⁴ just the size and distance apart to fit on the pins *o* of the front piece, while the cutters *e'* and *e''* cut a part of the wood away to form the round part; the circular cutter *e* finishes it so as to exactly fit on to the ends of the front piece *O* and make a perfect joint. Cutter *e*, by adding side cutters *e*⁴ to its upper edges, as seen in Fig. 10, will cut the joint, as seen in Fig. 9, only requiring a rack with teeth a little further apart, and the holes *i'* to be also increased in their distance apart from center to center to be equal to the notches from point to point. It will be necessary when the stuff has been wrought by the augers and cutters to stop the reciprocation of the carriages *D* and *F*, and this can be done by any known way of shipping the driving-belt upon a loose pulley on shaft *C*, and as such devices are well known and understood; and it being no part of my invention, it is neither described nor shown.

Operation.

The machine being constructed in all its parts, substantially as above described, and fully ready for operation with the ends or runners *O'* of the drawers placed in upright position, their ends resting on rest *E* and there securely clamped by turning up clamp-screws *g''* to force clamp-jaw *g*³ hard against stuff *O'*, which bears upon the face edge of plates *G* and *g*⁵ and the fronts or backs *O* of the drawers placed upon the face-plate *F'''* in a horizontal position, and there clamped by the screws *g* and clamps *g'* in the proper position with relation to the auger *b*⁵ and gauge-marker *j*, so that the auger will cut only to the gauge-mark or the thickness of the stuff *O'*, then the driving-pulley is put in motion, revolving-shaft *C* with its cams *C'* and *H*, and through belt *a'* the pulleys *b* and *b''* on arbors *b'* and *b'''* carrying augers *b*⁴ and *b*⁵ are revolved. Cam *C'*, in its revolution by its crooked or irregular faces bearing upon posts *c* attached to the un-

der side of carriage *D*, causes the said carriage to reciprocate toward the stuff that is to be acted upon, auger *b*⁴ boring hole *o'* in the runners or side piece *O'*, while hollow auger *b*⁵ bores away the wood around pin *o* in the front or backs *O*, and as these augers are advancing so is pin *d'* on the inner end of carriage *D* and enters into hole *i'* in rack *I*, holding the stock carriage *F* from moving laterally while carriage *D* and its augers and cutters are doing their work. When cam *C'* has forced carriage *D* and its augers and cutters forward to the extent of reciprocation in that direction, and they have done their work, it causes by its shape a reverse movement of carriage *D* to the point where it began to reciprocate, and here, for a short interval, it revolves without movement to the carriage in either direction, the holding-pin *d'* has been withdrawn and the stock carriage with its stock is ready to be fed forward. As the cam *C'* has forced the carriage back to the extent of its movement, and at the time of the cessation of its movement, cam *H* comes in contact with leg *h* of bifurcated lever *H'* forcing it by its construction to vibrate and move the spring catch or pawl to force the stock carriage forward the distance of a notch in the rack *I*, and as cam *H* revolves onward it strikes leg *h'*, which vibrates the lever *H'* in the reverse direction, and so that the spring pawl will catch into the next notch of the rack to be again forced forward as the cam strikes the leg *h* in its further revolution. As the carriage stock is fed along the distance of a notch at each revolution of the cam *H* the stuff *O'* is presented to the V-cutter *e''*, which cuts off a portion of the wood outside of the circular line and obliquely to the hole *o'*; and at the next forward movement it cuts off a similar piece with relation to the next hole; and as the stock carriage is fed forward a notch in the rack and presents the space cut by cutter *e''* immediately before cutter *e'*, which, being wider than cutter *e''*, cuts more of the wood away and nearer the circular line of the joint than was cut by cutter *e''*; and at the next feed forward, the two cutters *e'* and *e''* still continuing to cut their part at every reciprocation of carriage *D*, the circular cutter *e* is brought to act to finish the segment of a circle equal in diameter to that cut by the hollow auger *b*⁵—continuing so until the stock carriage *F* has been reciprocated with its stuff until cutter *e* has acted upon the last circle around hole *o'*, when the belt is shipped off, so that cams *C'* and *H* cease to revolve, but cam *H* turned to act upon lever *H'* to throw spring catch *i* out of gear with rack *I*; when the stock carriage *F* can be slid back, have the wrought stuff discharged and another charge clamped therein, and the operation renewed and continued.

A joint thus made is stronger and very much cheaper than the ordinary dovetail joint, for the reason that it can be made to be a better fit in the joints, and has a greater length of bearing surface, and at the same time makes a more beautiful and very much cheaper joint.

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

1. The cam C' in combination with the reciprocating carriage D, belt *a'*, pulleys *b* *b''*, and hollow auger *b*⁵, constructed and arranged to operate in the manner and for the purpose described.

2. The cam C', reciprocating carriage D, belt *a'*, pulley *b* in combination with the boring auger *b*⁴ and cutters *e*, *e'*, and *e''*, arranged to operate in the manner described.

3. The holder D'' reciprocating with the carriage D and cutters *e''*, *e'*, and *e*, in combination with the tool-stock D³, when the said tool-stock is pivoted within and can be turned up at a right angle with the holder D'', in the manner and for the purpose described.

4. The combination of cam H with the bifurcated pivoted lever H', spring-catch *i*, and notched rack I on stock carriage F, constructed and operating substantially as described.

5. The cam C', reciprocating carriage D having holding pin *d'*, in combination with rack I provided with holes *i'*, on stock carriage F, in the manner and for the purpose described.

6. The stock carriage F having clamp-screws

g, clamps *g'*, and the mechanism that feeds said carriage forward, in combination with the reciprocating and revolving hollow auger *b*⁵, and gauge-point *j*, substantially as described.

7. The stock carriage F having clamp-screws *g*, clamps *g'*, and the mechanism that feeds said carriage forward, in combination with the reciprocating and revolving hollow auger *b*⁵ and adjustable gauge-marker *j*, substantially in the manner described.

8. The stock carriage F having clamp-screws *g''*, returning pin and screw *g*⁴, clamp-jaw *g*³, standing rest E, in combination with the reciprocating boring-auger *b*⁴ and reciprocating cutters *e''*, *e'* and *e*, in the manner and for the purpose described.

9. The bifurcated vibrating lever H' with spring pawl *i*, when constructed in the manner shown, and for the purpose described.

10. In a machine for making joints such as described, the arrangement of the cutters *e''*, *e'*, and *e*, in the manner described.

CHARLES B. KNAPP.

NATHAN S. CLEMENT.

Witnesses:

ROBT. MCCrackEN,

FRED. N. SMITH.

(173)