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## IMPROVEMENT IN DOVETAILING-MACHINE.

The Schedule referred to in these Letters Patent and making part of the same

*To all whom it may concern:*

Be it known that I, HENRY H. BASHORE, of the city and county of Philadelphia, and State of Pennsylvania, have invented certain new and useful Improvements in Convertible Dovetailing and Shaping-Machines; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawings which make part of the same, and in which—

Figure 1 represents a plan or top view of my machine as arranged for tenoning and mortising window-sash.

Figure 2 represents a vertical transverse section through the line *xx* of fig. 1.

Figure 3 represents a section taken at right angles to fig. 2 at the line *yy* of fig. 1, showing the machine converted from a mortising and tenoning to a shaping-machine, the mandrel carrying the dovetailing cutter turned down beneath the table of the shaping-machine.

Figure 4 represents a portion of the mandrel, showing the manner of adjusting and clamping the cutters to the threaded end thereof.

Figure 5 represents an elevation of a portion of one of the mandrels with the coping-head and tenoning-tool thereon.

Figure 6 represents an elevation of a portion of the mandrel and the cutters used in the shaping-machine.

Figure 7 represents a section of the carriage, showing the compound adjustable supporting-rail and gauge.

My invention consists in adjusting the cutters of the mortising, tenoning, and dovetailing-tools to adapt them to varying thicknesses of sash by means of a male screw-thread formed on the upper ends of the mandrels, a female screw-thread, formed in the eye of the cutter-plate, and a clamping-nut, whereby they are adjusted and clamped to said screw-threaded mandrel without the use of washers, as heretofore practised, and avoiding the necessity for a vertical adjustment of the mandrel and its supporting-plate, whereby said adjustment can be made with the greatest degree of exactness and facility, and without the removal of the cutters to remove and replace washers of different thicknesses.

My improvement further consists in converting a sash-machine into a machine for shaping and dressing regular and irregular forms without removing either of the mandrels from their supporting-frames by means as will be hereinafter described.

In the accompanying drawings—

A represents the frame of a machine, carrying near the middle thereof two vertical mandrels, B C, fig. 2,

upon which are secured the mortising, tenoning and dovetailing-cutters, and a transverse gauging-carriage, D, and at one end thereof a boring-mandrel, E, operated in connection with the cutter-mandrels.

The mandrels B and C are secured in suitable boxes in vertical cast-iron frames F F', attached to the main frame A in any convenient manner.

The mandrel B carries, at its upper end, suitable cutters *a a'*, for cutting the mortise and tenons in the stiles and meeting rails, as shown in figs. 1 and 2, and the mandrel C carries the cutter *b*, for cutting the dovetail of the several parts, and the arm H, which supports its journal-bearings, is pivoted near its lower end at I to its supporting-frame F', to allow of the oblique adjustment of the mandrel C for giving the proper inclination to the dovetail, and said mandrel, when so adjusted, is held by a clamp-screw, J, fitting in a slot, *c*, fig. 3, made concentric with the axis of the pivot of said mandrel.

The plate F', which carries this mandrel, is also made adjustable horizontally by means of a screw, K, secured to the main frame for adjusting the mandrel C of the said dovetailing-cutter *b* toward or from the transverse carriage D, to give to the material the proper depth of mortise.

The carriage D, upon which the material is placed, is fitted to move upon ways *d d'* across the end of the machine, so as to present the end of the stile or meeting rail successively to the cutters to cut the mortise, tenon, and dovetail at one operation.

The cutters consist of a steel plate formed into four (more or less) curved arms, of equal radius, with their ends beveled, so as to form chisel cutters, as shown in fig. 1.

In order to secure them upon their mandrels without the necessity of being placed between washers, I reduce the upper ends *e* of the mandrels, in diameter, a length necessary for the reception and adjustment of the cutter-plates, and form thereon screw-threads *e*, and provide the eye of the cutter-plates with corresponding screw-threads, so as to be screwed directly onto the screw of the mandrels, and in connection with each screw-mandrel and cutter-plate I employ a single screw-nut, L, arranged either below or above the cutter, as more clearly shown in fig. 4, so that when the cutter-plate or plates are properly adjusted upon the mandrel, the nut or nuts L need only be brought in contact with the cutter-plates so as to bite the two firmly together to clamp them securely upon the screw-mandrel *e*, so that neither can turn independently of the mandrel.

This method of securing the cutters also allows them to be adjusted by the threads *e* of the mandrel with the greatest exactness, up or down upon the mandrel, by simply loosening the clamp-nut L, turn-

ing the cutter to the right or left, and by means of a common wrench, lock it with the nut L, so that the strain upon the threads of the nut and the cutter-plates will be communicated vertically upon the threads *e* of the mandrel embraced between each cutter-plate and the nut to such a degree as to unite them securely.

This method of securing the cutters also obviates the necessity of removing them from the mandrel to remove and substitute washers of different thicknesses. It also obviates the necessity of making the frame which carries the mandrel adjustable vertically to compensate for the difficulty of making the proper adjustment by washers, as heretofore.

The mandrels of the cutters thus arranged and operating are provided with pulleys M N, around which a band, O, passes to give motion thereto, while a band P passes from a second pulley on the mandrel B to a pulley on the horizontal driving-shaft Q at the end of the frame from which a band, R, also, leads to drive the boring-mandrel E, as shown in fig. 1.

The carriage is provided, in the usual manner, with two supporting-rails or guide-bars *f g*, one of which, *f*, is made fixed, the other, *g*, adjustable in the direction of its length.

These bars are also provided with adjustable gauge-plates *h i*, to gauge the material to the proper depth of cut.

The adjustable guide-bar *g* is secured to the carriage D by means of clamp-screws passing through slots in the latter, by which it may be adjusted and clamped, and in order to increase the capacity of this adjustment of the supporting-bar, I also make the gauge-plate *i* of this bar adjustable by means of a slot and clamp-screw, as shown in fig. 7, by which it may be moved in or out, and clamped independently of the adjustable supporting-rail *g*.

This supporting-bar *g* has its sides inclined downward, and the upper surface of the carriage on either side of the bar is beveled to form a right angle with the said inclined bar, to hold the material at the proper angle to the dovetailing-cutter, as shown in fig. 2.

The operation of the machine, as thus organized, consists simply in placing the material at the proper gauge upon the carriage, so as to receive first the action of the upper cutter *a* to cut the recess for the check side of the meeting rail, while the lower cutter *a'*, on the same mandrel, cuts a slot through from the face of the mortise, after which the carriage D is moved on to the cutter *b* of the second mandrel, which cuts out the remaining portion of the mortise and gives it the required dovetail, which finishes the end of the stile.

In cutting the stile of the upper sash, the dovetailing-cutter *b* is adjusted toward the carriage to give it the proper dovetail, and in cutting the stile of the lower sash the cutter is adjusted from the carriage.

In cutting the tenons of the meeting rails, the cutters *a a'* are removed from the mandrel B, and instead thereof the coping-head S of cutters is adjusted upon the screw-end *e* of the mandrel, and a cutter-plate, *a*, immediately above. The coping-head S cuts the recess to form the coping-shoulder for the molding of the stile, while the upper cutter cuts the upper part of the mortise. The carriage D is then moved on to the second mandrel C to receive the action of the dovetailing-cutter *b*, the mandrel of which is adjusted vertical, while the meeting rail is held against the inclined side of the guide-bar *g* and the inclined part *j*, of the carriage D, to incline it to the proper angle for

the dovetail. The opposite end of the meeting rail is cut in the same manner, by turning it end for end, and placing it against the outer inclined side of the guide-rail and inclined part *j'* of the carriage.

The horizontal boring-mandrel E is provided with bits and augers, for the purpose of boring the holes in the stiles to receive the sash-cord, and in which to form the knot by which it is connected to the sash.

In changing the machine thus described, for preparing sash for window-frames into a machine for shaping regular and irregular forms, neither of the mandrels is removed, but the cutters of mandrel B are taken off. The organization of the machine is then changed by removing the carriage D and turning up the inner horizontal carriage-way *d'*, which is hinged for that purpose at one end, as shown in dotted lines in fig. 2, so as to allow the mandrel C of the dovetailing-cutter to be brought over into the space beneath the said carriage-ways, and thus be entirely below the top of the frame, the way *d'* being held rigidly, when in place, by fitting into a groove and over a guide-pin in the frame, as shown in fig. 2, leaving the top of the latter clear, to receive a table, T, having a hole therein through which the threaded end of the mandrel B projects, as shown in fig. 3, to receive the shaping-cutters, which are clamped and adjusted between collars in the usual manner, and the material shaped or dressed according to any desired pattern.

The frame of this mandrel, when so used, may be adjusted vertically, to bring the cutters to the proper height in connection with the pattern, in the ordinary way.

Turning the mandrel C beneath the top of the frame, it will be observed, obviates the necessity of its removal from the frame, and thus the additional advantage of avoiding the necessity of removing the cutter therefrom, which is turned out of the way by unclamping it and its clamping-nut, and screwing them down against the shoulder of the mandrel. Previous to turning the mandrel beneath the frame out of the way, it is only necessary to slip the band O from either one or both of the pulleys M N of the mandrels, as shown in fig. 3.

The change, therefore, from a sash-machine to a shaping-machine by the means described, is effected with facility, and whilst it doubles the capacity of the machine, involves comparatively no labor.

Having thus described my invention,

I claim—

1. In a dovetailing-machine having two vertical mandrels with cutters above the table, so arranging one, C, within the frame, that it may be turned with its saws beneath the table T, and out of the way, for the purpose of adapting a sash-tenoning machine to be used with its fixed mandrel B as a turning and shaping-machine without removing either of the mandrels from their bearings, as herein shown and described.

2. The inner way *d'* of the carriage D, hinged for the purpose of allowing it to be turned up, to admit the mandrel C and its cutter to be turned thereunder out of the way in changing the machine, as herein described.

In testimony whereof I have hereunto signed my name.

HENRY H. BASHORE.

Witnesses:

T. H. UPPERMAN,  
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