

July 7, 1959

D. HADNAGY
DOVETAILING MACHINE

2,893,449

Filed Oct. 17, 1955

4 Sheets-Sheet 1

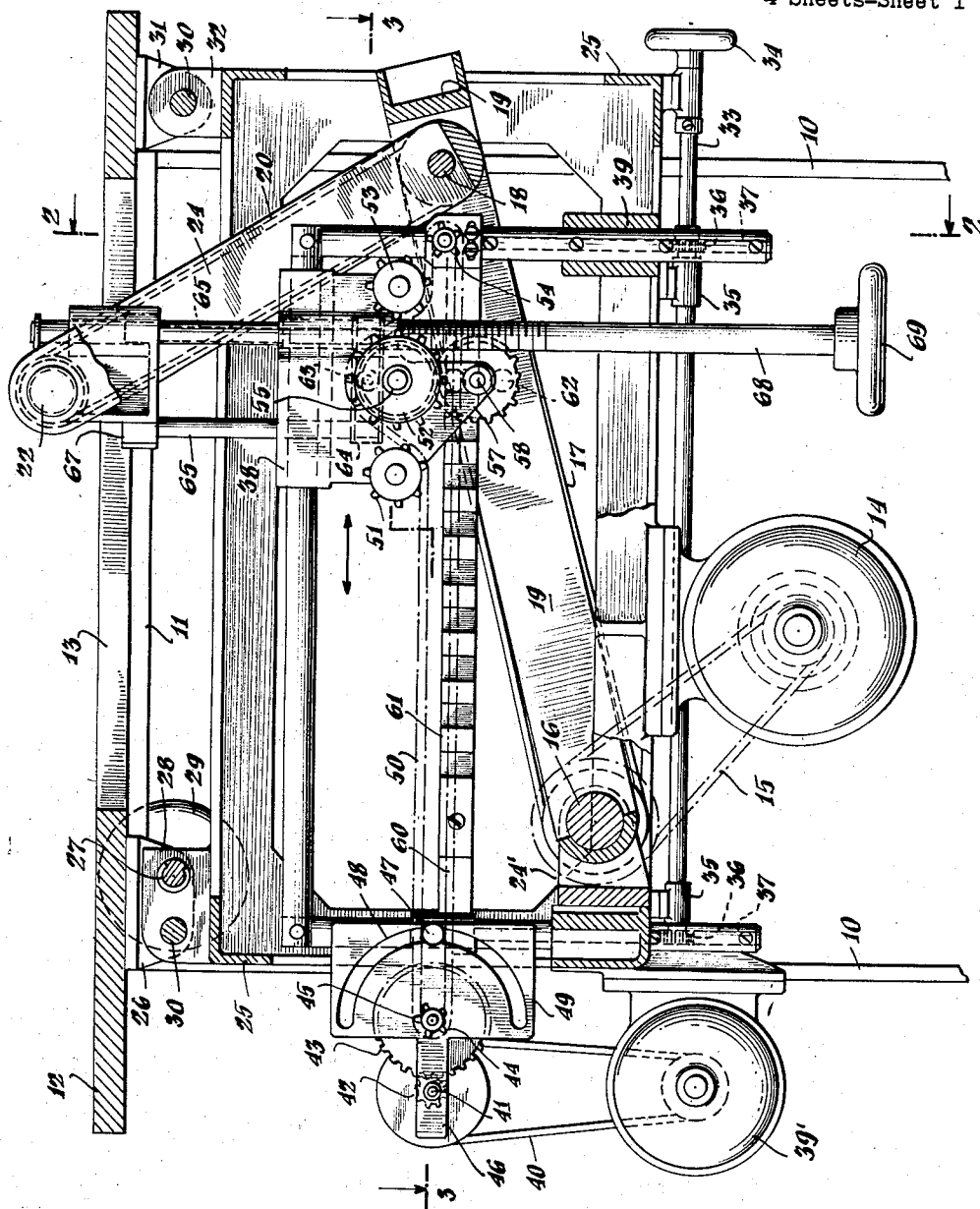


Fig. 1

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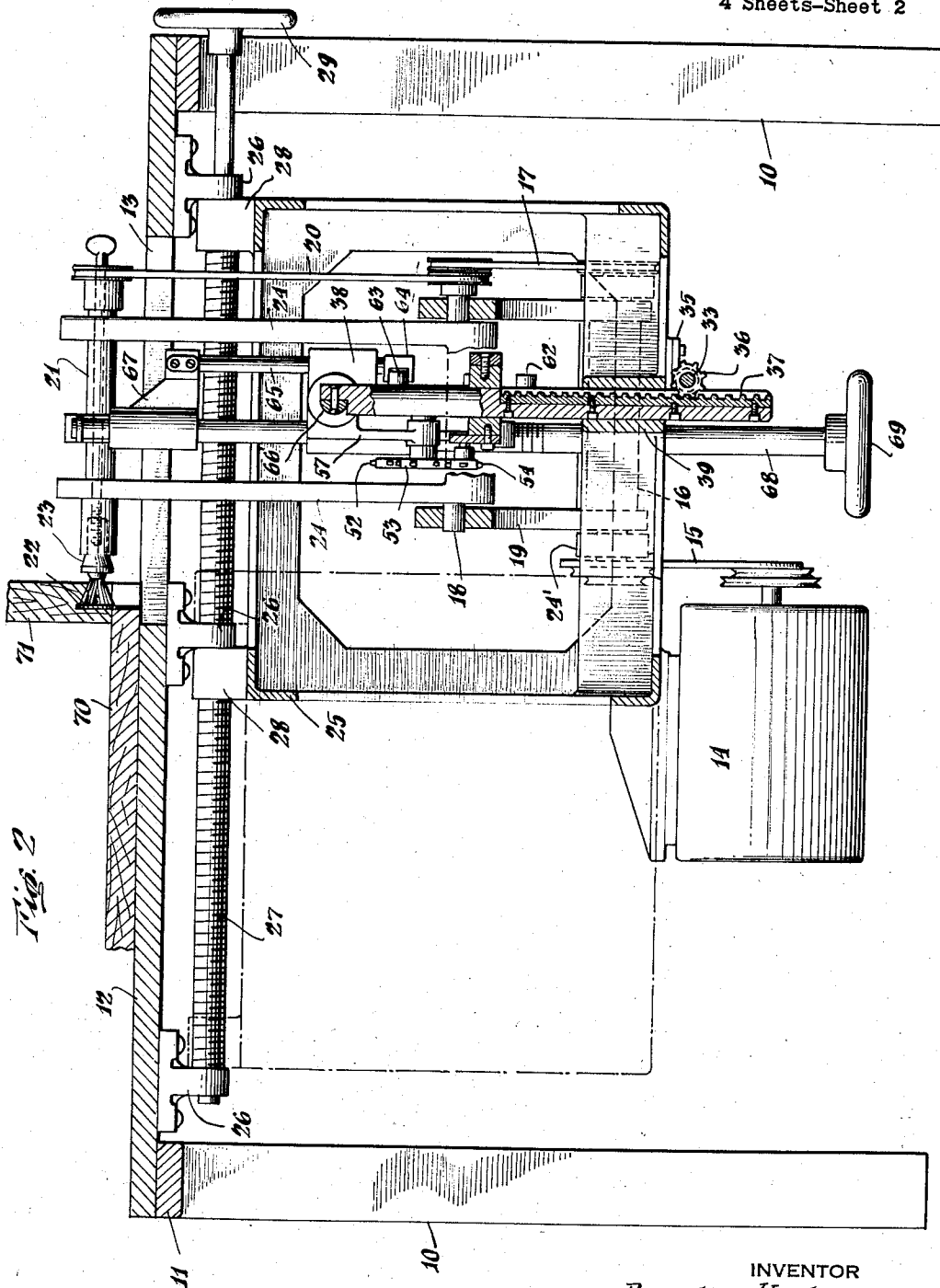


Fig. 2

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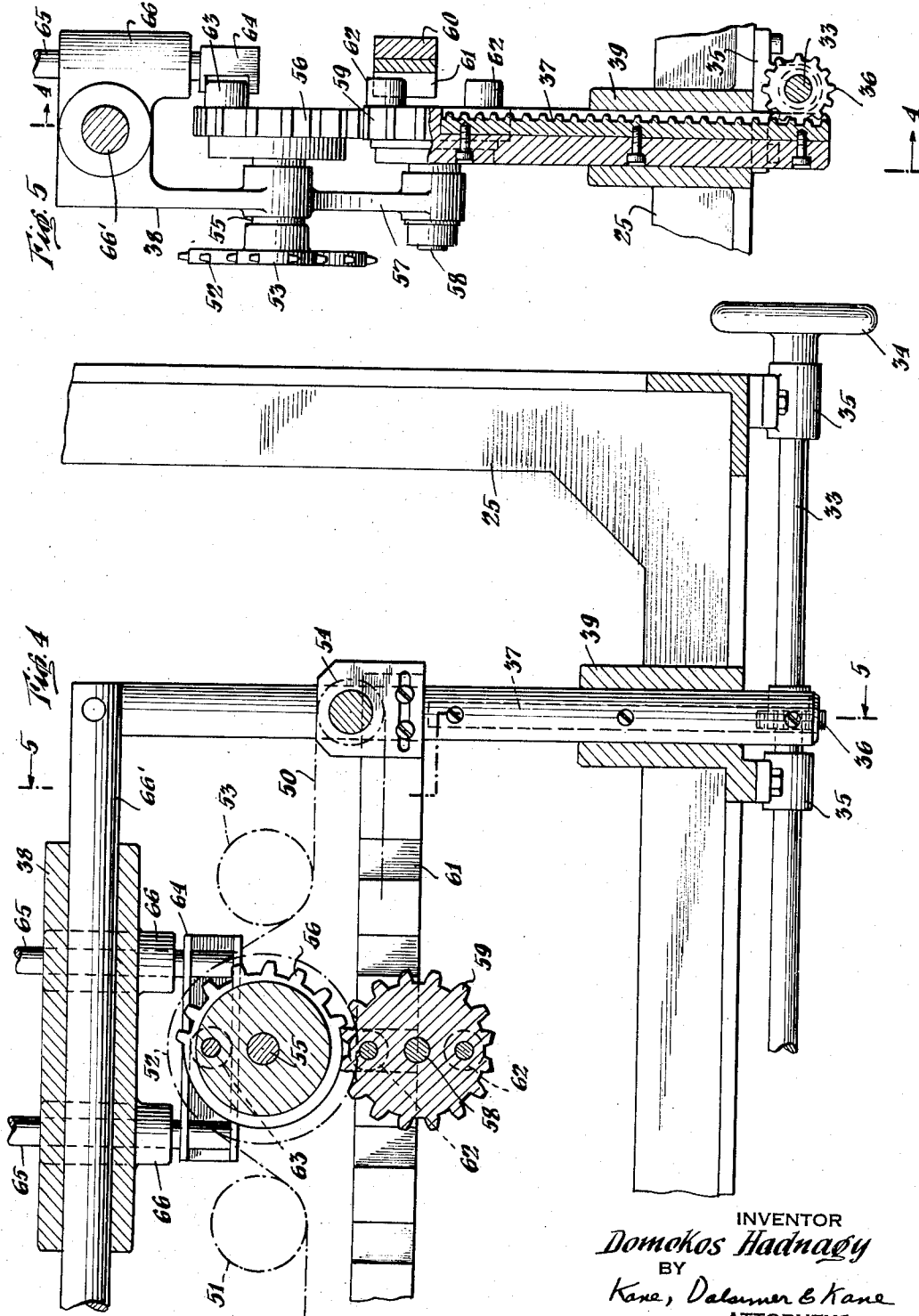
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DOVETAILING MACHINE

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6 Claims. (Cl. 144—87)

This invention relates to a structurally and functionally improved machine by means of which dovetailing operations may be expeditiously accomplished in connection with various materials such as wood, plastic, etc.

By means of the present teachings, a mechanism is provided embracing preferably a single tool and operating spindle which will automatically produce a pair of cooperating dovetailing assemblies each embracing a series of tenons. Accordingly, it will be unnecessary to utilize a machine involving the cumbersome arrangement of parts, the multiple spindles and tools, etc., which have heretofore been necessary where dovetailing assemblies were to be produced. As a result of the present construction, a relatively simple, light weight and inexpensive mechanism is possible.

A further object is that of designing a machine of such character which will involve relatively few parts, each individually simple and rugged in construction, such parts being capable of ready assemblage to furnish a unitary mechanism operating over long periods of time with freedom from all difficulties.

With these and other objects in mind, reference is had to the attached sheets of drawings illustrating one practical embodiment of the invention, and in which:

Fig. 1 is a partly sectional side view of a machine assembly;

Fig. 2 is a transverse sectional view taken along the line 2—2 in the direction of the arrows as indicated in Fig. 1;

Fig. 3 is a sectional plan view taken along the line 3—3 in the direction of the arrows as also indicated in Fig. 1;

Fig. 4 is a fragmentary sectional side view in enlarged scale showing a detail of the operating mechanism and taken along the line 4—4 in the direction of the arrows as indicated in Fig. 5;

Fig. 5 is a transverse sectional view taken along the line 5—5 in the direction of the arrows as indicated in Fig. 4;

Fig. 6 is a fragmentary plan view showing a pair of material sheets after the completion of the dovetail formation and before the assembly of those sheets;

Fig. 7 is a fragmentary edge view of the sheets in finally assembled condition;

Fig. 8 is a fragmentary top perspective view of one of the sheets after the completion of the forming operation; and

Fig. 9 is a bottom perspective view involving a fragment of the second sheet after the completion of such operation.

Referring primarily to Figs. 1 and 3, the numeral 10 indicates supports or legs extending upwardly from a base (not shown). These support at their upper ends a mounting or horizontal portion 11. In turn disposed above the latter is a deck or table 12 to receive the material to be worked upon. That deck or table is formed with an opening 13. Through the latter the head of the machine, including the operating spindle and tool,

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projects to cooperate with the work-sheets supported upon deck 12.

The frame of the machine mounts a motor 14. By means of a suitable drive extending therefrom and preferably involving a belt 15, a shaft 16 is rotated. The latter again conveniently, by means of a belt 17, serves to drive a shaft 18. These shafts 16 and 18 are mounted at opposite ends of a supporting member 19. Shaft 18, by means of a belt 20, serves to drive a spindle 21. This spindle mounts the forming tool 22 by means of a chuck 23 or other suitable coupling member.

A frame 24 extends through opening 13 and supports at its upper end the spindle 21 at a point normally above deck 12. The lower end of frame 24 is coupled to shaft 18 driven by belt 17. The upper end of frame 19—as afore brought out—is connected to shaft 18 and has its inner or lower end connected to shaft 16 by, for example, extending through bearing member 24' project from the frame of the machine. In this manner, spindle shaft 21 may be moved upwardly and downwardly as well as in lateral directions without affecting the efficiency of the drive provided by the motive force 14.

Within the main frame of the machine, a movable frame 25 is disposed. As illustrated, this movable frame may include members defining a generally cubical or rectangular arrangement of parts. Brackets 26 may extend downwardly from the deck 12 or the supporting portions 11 and rotatably mount a threaded shaft 27. This shaft bears within the threaded bores of extensions 28 projecting from the upper parts of movable frame 25. A hand wheel 29 or other operating medium is secured to shaft 27 for the purpose of rotating it as illustrated in Fig. 2. Rods 30 may also be supported by brackets 26 and corresponding brackets 31 adjacent the opposite ends of deck 12 slidably bear within the openings of extensions 28 and 32. Therefore, when shaft 27 is turned, frame assembly 25 will move to the left and the right, based upon the showing in Fig. 2. The spindle 21, the driving mechanism therefor and the motor 14, being all carried by the frame assembly 25, it follows that with this adjustment of shaft 27 these parts are correspondingly shifted.

The vertical adjustment of the spindle 21 is achieved by again conveniently employing an operating shaft 33 provided with a hand wheel 34 extending beyond the frame assembly 25 of the mechanism. This shaft is rotatably supported by bearings 35 conveniently extending from this frame assembly. As shown especially in Fig. 2, shaft 33 has secured to it a pinion 36. The teeth of this member mesh with the teeth of a rack 37 supporting at its upper end a carriage 38. The rack is confined to movement in a vertical path by, for example, a guide 39 which slidably encircles it and which is secured to the frame assembly 25. A pair of these pinion, rack and guide assemblies is furnished and disposed one adjacent each end of shaft 33 as shown especially in Fig. 1. Therefore, when wheel 34 or its equivalent is turned to rotate shaft 33, these racks will be simultaneously retracted or projected.

A second motor 39' is conveniently mounted between a pair of legs 10. This motor, by means of a belt 40 and pulleys, serves to drive a shaft 41. The latter supports a pinion 42, the teeth of which mesh with a gear 43. That gear also serves to drive a pinion or sprocket 44 by means of a shaft 45 supporting both of these elements. This shaft extends through a frame assembly 46 which may be generally rectangular as shown particularly in Fig. 3. Therefore, this frame is pivotally supported. Likewise, shaft 41 will be similarly supported in that it is carried by frame 46. The inner end of the latter terminates in an extension mounting a bolt 47. The head of that element rides beyond a slot 48 formed

in a plate 49 attached to the frame assembly 25. When the vertical adjustment provided by shaft 34 is to be resorted to, then bolt 47 is loosened. The shifting of the parts is accomplished so that the spindle occupies the desired position and during this shifting or else immediately following the same, frame 46 is adjusted by swinging the same around the pivot defined by shaft 45. Under these circumstances, pinion 42 will travel around the periphery of gear 43. Belt 40 will remain taut and the driving relationship established by motor 39' to sprocket 44 will be maintained. Thereafter, bolt 47 may again be tightened to maintain the parts in the desired positions.

A driving member, preferably in the form of a chain 50, extends around sprocket 44. It passes under an idler sprocket 51 over a driving sprocket 52 and under an idler sprocket 53. Thence, it passes in a reverse direction back to sprocket 44. Therefore, with motor 39' operating, a continuous drive will be established to sprocket 52 and regardless of whether the latter is in the position shown in Fig. 1 or whether it is occupying a position substantially to the left of that illustrated in such figure. Likewise, this drive will be maintained if the axis of this sprocket and its related units are shifted in an upward or downward direction incident to the adjustment of the carriage 38 mounting the same. In this connection, it will be borne in mind that bracket 46 will simply be swung after loosening bolt 47 to compensate for any adjustment which may have been made.

Sprocket 52 is mounted by a shaft 55 supported by carriage 38. A gear 56 is attached to this shaft and has teeth extending only through part of its periphery (for example a hundred and fifty degrees). As extension 57 is provided as part of carriage 38 and rotatably supports a shaft 58. Mounted by the latter and as shown in Figs. 4 and 5, is a gear 59 which has its teeth engageable with the teeth of gear 56. The teeth of gear 56 adjacent the ends of the arcuate series are interrupted to provide, in connection with gear 59, a movement of spindle 21 and consequently tool 22 that follows a path as illustrated in Fig. 6. In this connection, it will be noted that adjacent teeth are mutilated to incorporate a "holding" provision against the smooth peripheral surface portion of gear 56 and that pairs of these teeth are separated 180°. To the rear of gear 59, a bar 60 is disposed. This bar is connected to frame 25 in a manner so that it may be adjusted to occupy a proper position and thereupon be locked against further movement with respect to that frame. The bar has in its forward face a series of notches 61. These are engageable with shifting elements preferably in the form of rollers 62 secured to the inner face of gear 59.

Mounted to extend from the rear face of gear 56 is a similar shifting element in the form of a roller 63. This rides within the groove defined by a member 64 which is U-shaped in section. The latter lies in a preferably horizontal position and has connected to its rods 65. These ride within the bores of guide portions 66 forming a part of carriage 38 to, in effect, provide a crank and connecting rod assembly. That carriage is slidable along the upper bar 66' of a frame shiftably carried by the frame 25. Rods 65 are connected at their upper ends to a head 67 rotatably supporting spindle 21. Finally, it will be noted that a further adjusting shaft 68 may conveniently extend from the lower end of the assembly and mount an operating wheel 69. The adjustment factor provided by this shaft is ordinarily used only when the machine is to be employed for other than dovetailing operations. In that case, head 67 and spindle 21 may be conveniently dismantled.

Considering now the operation of the machine, it will be understood that an operator will primarily dispose sheets of material such as wooden boards 70 and 71 upon the upper surface of deck 12 and in overlapping relationship with respect to the opening 13. These sheets will be arranged at right angles with respect to

each other, as shown in Fig. 2, and are secured against displacement with respect to one another or the deck by any suitable means. Sheet 70 will extend across the lower edge of sheet 71. At this time, or else prior thereto, the depth of the material-removing operation will be properly provided for by laterally adjusting the main frame 25 by rotating shaft 27. Also, if necessary, adjustment may be resorted to in a vertical direction with respect to the deck by turning shaft 33. Such adjustments will in no wise interfere with the driving of spindle 21 and the tool 22 attached thereto, nor will they interfere with the drive of the chain 50 or its equivalent by the motor 39'. It will be borne in mind that when vertical adjustment is necessary, bolt 47 may be loosened, the parts shifted and the bolt thereupon tightened in order to assure continuity of drive of sprocket 52 by means of chain 50 or its equivalent. It is, of course, apparent that, in lieu of bolt 47 and the slotted plate structure 48-49, any suitable form of connection assuring a continued rotation of shaft 55 may be utilized.

Now with both motors operating, tool 22 will constantly turn. That tool will be traversed in the manner generally indicated in Fig. 6 to follow a final path partially in the body of sheet 70 and partially in the body of sheet 71. This will result as a consequence of gear 59 being rotated by gear 56. With each rotation of the latter gear, the bar or yoke 64 is reciprocated through an entire cycle. Gear 59 is, of course, intermittently rotated due to the interrupted arrangement of teeth disposed at the outer periphery of gear 56. As it rotates, it advances along bar 60 carrying with it carriage 38. Therefore, the cutter will traverse the desired routing path along the entire length of the edges of sheets 70 and 71 in a path as shown in Fig. 7.

In Figs. 8 and 9, these sheets have been shown in separated condition. As will be observed in the first figure, tenons 72 are formed by the afore described operation and which include upstanding tapered portions having rounded forward edges. In sheet 71, tenons 73 are formed at points intervening recesses 74. These are also each tapered and have their rear walls curved to correspond to the curvature in the forward faces of tenons 72. Therefore, as in Fig. 7, the sheets may be reversed with the tenons 72 of sheet 70 extended into the recesses 74 of sheet 71. Adhesive or other securing media may be employed. In any event, an interlocked dovetailed construction is furnished. This will be extremely effective—if adhesive is used—because of the grooves formed by the outstanding cutting edge of the tool. Such recesses will receive and retain the parts extending into the same.

When a forming operation in one direction has been completed, then by simply reversing the operation of motor 39' and with the placing of new sheets upon the deck, a second operation may be performed. Of course, in lieu of a reversible motor, any desired arrangement of mechanism may be resorted to in order to permit a return of the parts to the initial position, as shown for example in Fig. 1. In many respects, reversing of the motor is preferred in that it will not be necessary to return the parts through an inoperative cycle.

Thus, among others, the several objects of the invention as specifically aforementioned are achieved. Obviously, numerous changes in construction and rearrangements of the parts might be resorted to without departing from the spirit of the invention as defined by the claims.

I claim:

1. A dovetailing machine including in combination a support to receive a pair of sheets with the edge face of the first disposed in contact with a side face of the second in a zone adjacent its edge and with the bodies of said sheets disposed at right angles with respect to each other, a rotatably mounted tool spindle having its axis disposed in a plane substantially parallel to that in which the second

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sheet is arranged, means for projecting said spindle in a plane normal to the body of the second sheet to cause a tool carried thereby to pass through the edge zone of that sheet and in a direction parallel to the body of the first sheet into the edge zone of the latter to provide tenons in the adjacent edge zones of both, means for retracting the spindle to withdraw the tool carried thereby to a point substantially adjacent that face of the second sheet which is opposite that in contact with the first sheet, means for thereupon shifting said spindle in a direction parallel to the edge of the first sheet and means for continuing the afore-recited projecting, withdrawing and shifting movements of said spindle, a carriage for said spindle, a reciprocable support for said carriage, means for guiding said carriage and reciprocable support in a direction substantially parallel to the edges of said sheets, a pair of co-operating gears, means for driving one of the same, a crank associated with one of said gears and engaging said latter support to reciprocate the same and further means associated with the other gear for moving said carriage along said guiding means, and said further means including a member formed with a series of recesses and support-advancing means associated with the other gear to sequentially engage said recesses.

2. A dovetailing machine including in combination: a support to receive a pair of sheets with the edge face of the first disposed in contact with a side face of the second in a zone adjacent its edge and with the bodies of said sheets disposed at right angles with respect to each other; a frame coupled with said support; a rotatably driven tool spindle mounted on said frame; said spindle and said frame being displaceable with respect to said support in a direction parallel to the axis of said spindle; means coupled with said frame for raising and lowering said spindle with respect to said support; second means coupled with said spindle for imparting thereto a selected continuous reciprocating motion in an up and down direction with respect to said support and said frame; further means coupled with said second means for reciprocating said spindle and intermittently driven thereby at selected intervals for imparting an interrupted lateral movement to said spindle with respect to said support and said frame in a plane substantially normal to the axis of said spindle, said second and further means being so constructed and arranged that said lateral movement is adapted to be continuous until a predetermined displacement of said spindle is attained.

3. A dovetailing machine including in combination: a support to receive a pair of sheets with the edge face of the first disposed in contact with a side face of the second in a zone adjacent its edge and with the bodies of said sheets disposed at right angles with respect to each other, a shaft rotatably mounted on said support; a frame mounted on said shaft, said frame being displaceable with respect to said support upon rotation of said shaft; a rotatably mounted tool spindle having its axis disposed substantially parallel with the axis of said shaft, said spindle being displaceable with said displacement of said frame; means coupled with said frame for rotating said spindle; means coupled with said frame for raising and lowering said spindle with respect to said support; second means coupled with said spindle for imparting thereto a selected continuous reciprocating motion in an up and down direction with respect to said support and said frame; further means coupled with said second means for reciprocating said spindle and intermittently driven thereby at selected intervals for imparting an interrupted lateral movement to said spindle with respect to said support and said frame in a plane substantially normal to the axis of said spindle, said second and further means being so constructed and arranged that said lateral movement is adapted to be continuous until a predetermined lateral displacement of said spindle is attained.

4. A dovetailing machine including in combination: a

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support to receive a pair of sheets with the edge face of the first disposed in contact with a side face of the second in a zone adjacent its edges and with the bodies of said sheets disposed at right angles with respect to each other; a frame supported by said support; a rotatably driven tool spindle mounted on said frame; means coupled with said spindle for imparting thereto a selected continuous reciprocating motion in an up and down direction with respect to said frame; second means coupled with said means for reciprocating said spindle and intermittently driven thereby at selected intervals for imparting an interrupted lateral movement to said spindle with respect to said frame in a plane substantially normal to the axis of said spindle, both of said means being so constructed and arranged that said lateral movement is adapted to be continuous until a predetermined displacement of said spindle is attained.

5. A dovetailing machine including in combination: a support to receive a pair of sheets with the edge face of the first disposed in contact with a side face of the second in a zone adjacent its edges and with the bodies of said sheets disposed at right angles with respect to each other; a frame supported by said support; a rotatably driven tool spindle mounted on said frame; a rotatably driven gear having interrupted gear teeth disposed at the outer periphery thereof rotatably mounted on said frame; a crank mounted on said gear; a carriage for said spindle; a reciprocable support for said carriage; means for guiding said carriage and reciprocable support in an up and down direction with respect to said frame; said crank and said reciprocable support being in an engaging relationship to impart a continuous reciprocating motion to said spindle in an up and down direction with respect to said frame; second means coupled with said gear and intermittently driven thereby at selected intervals for imparting an interrupted lateral movement to said spindle with respect to said frame in a plane substantially normal to the axis of said spindle, said gear and said second means being so constructed and arranged that said lateral movement is adapted to be continuous until a predetermined displacement of said spindle is attained.

6. A dovetailing machine including in combination: a support to receive a pair of sheets with the edge face of the first disposed in contact with a side face of the second in a zone adjacent its edges and with the bodies of said sheets disposed at right angles with respect to each other; a frame supported by said support; a rotatably driven tool spindle mounted on said frame; first means coupled with said spindle for imparting thereto a selected continuous reciprocating motion in an up and down direction with respect to said frame; a gear having a plurality of mutilated gear teeth disposed at its outer periphery, said gear being coupled with said means for reciprocating said spindle and intermittently driven thereby at selected intervals; a member having a series of recesses mounted on said frame; support-advancing means carried by said gear to sequentially engage said recesses upon movement of said gear to impart an interrupted lateral movement to said spindle with respect to said frame in a plane substantially normal to the axis of said spindle; said first means and said gear being so constructed and arranged that said lateral movement of said spindle is adapted to be continuous until a predetermined displacement of said spindle is attained.

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