

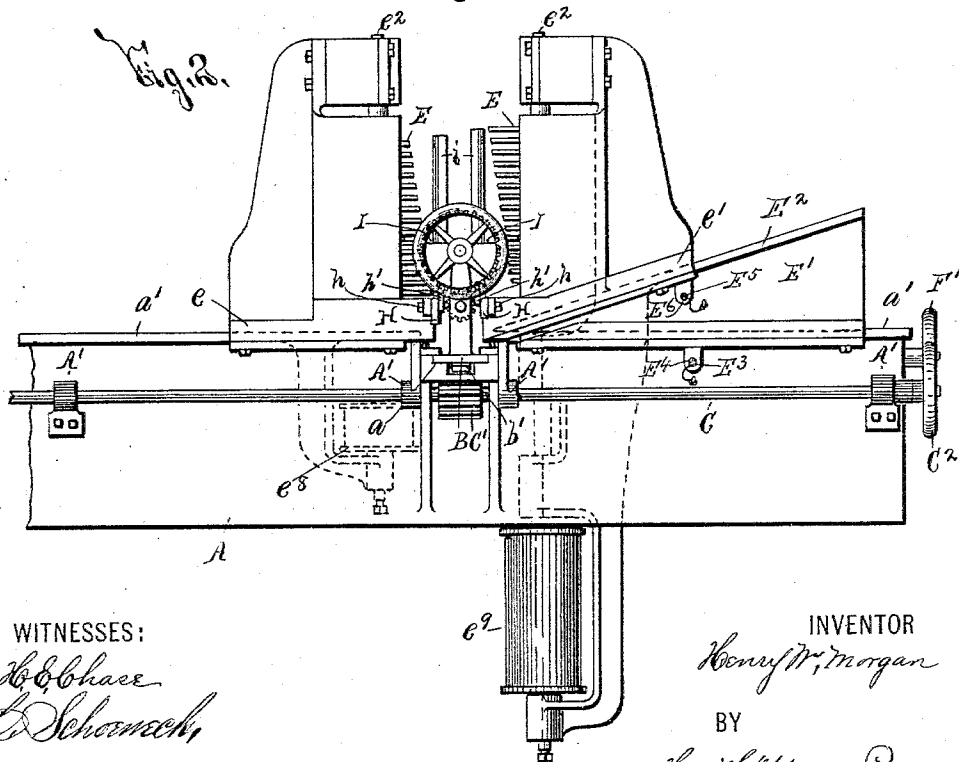
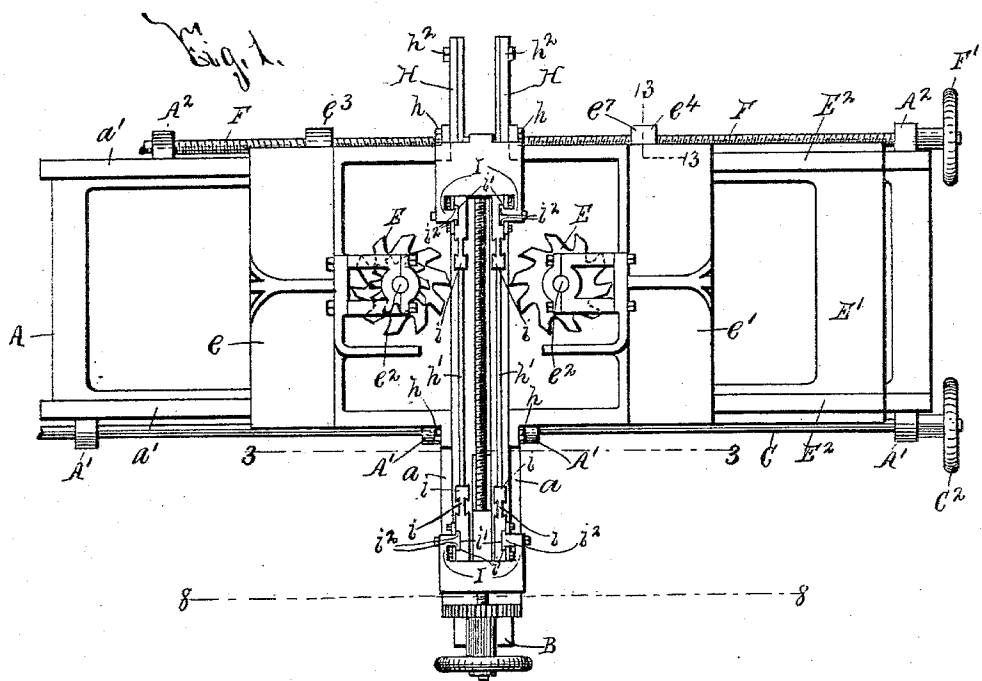
(No Model.)

5 Sheets—Sheet 1.

H. W. MORGAN.
GROOVING MACHINE.

No. 565,213.

Patented Aug. 4, 1896.



WITNESSES:

H. C. Chase
C. Schornack

INVENTOR

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BY

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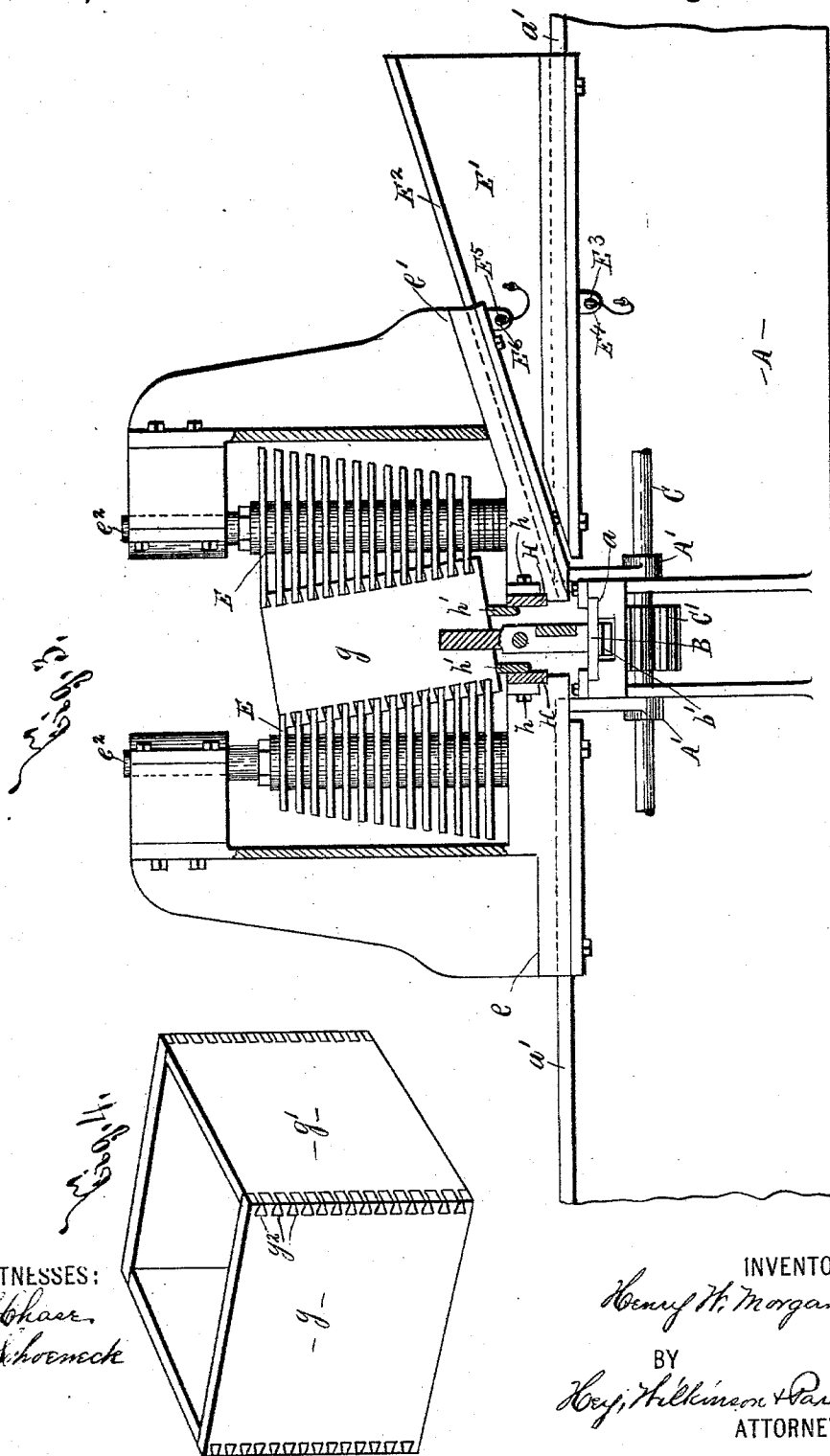
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5 Sheets—Sheet 2.

H. W. MORGAN.
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No. 565,213.

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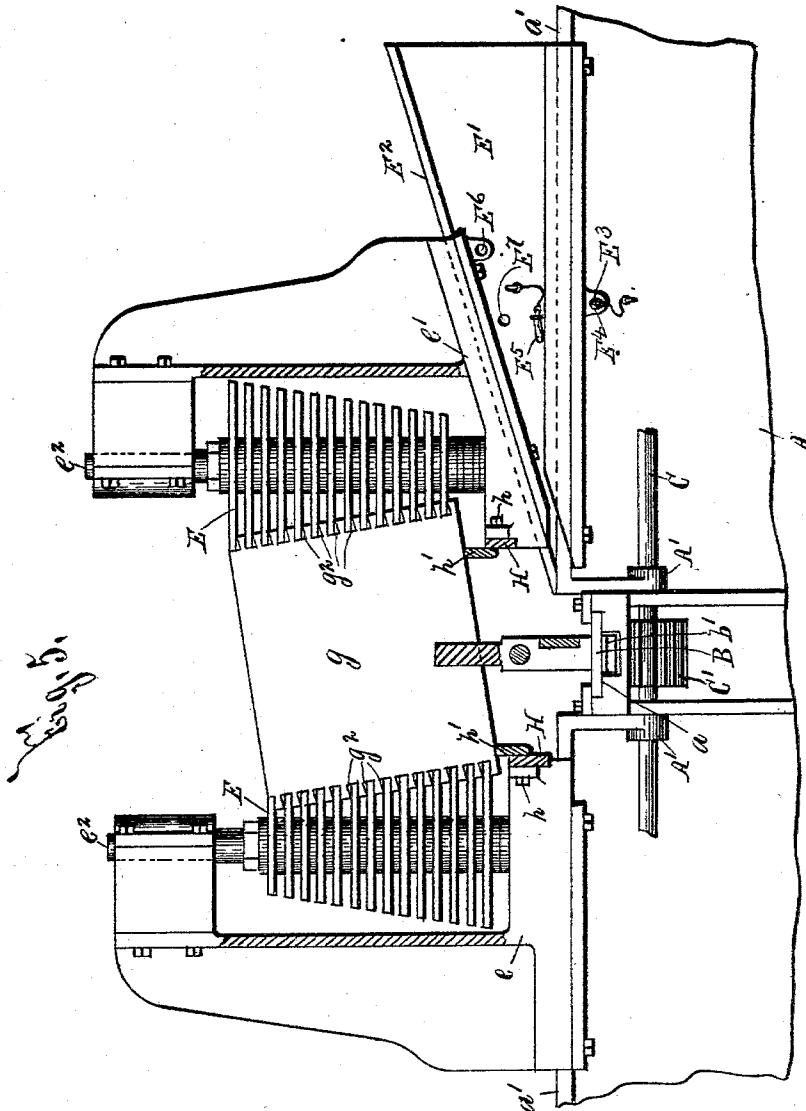
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H. W. MORGAN.
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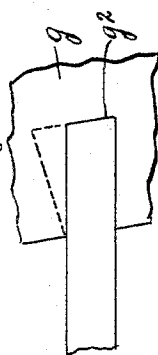
No. 565,213.

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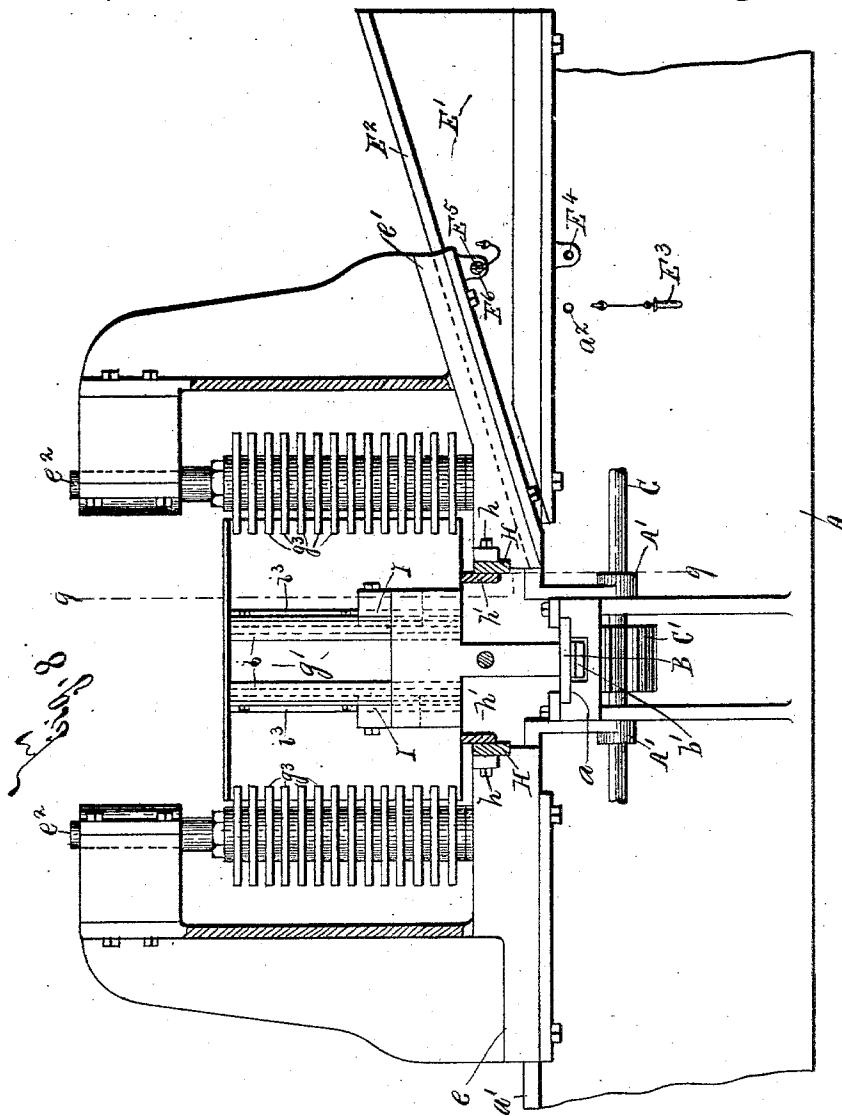
(No Model.)

5 Sheets—Sheet 4.

H. W. MORGAN.
GROOVING MACHINE.

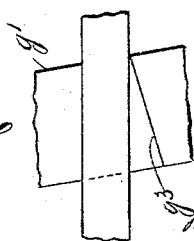
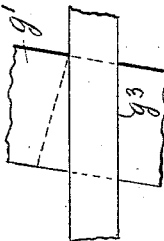
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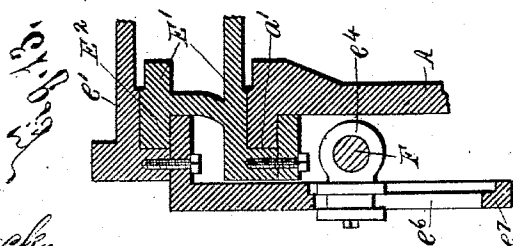
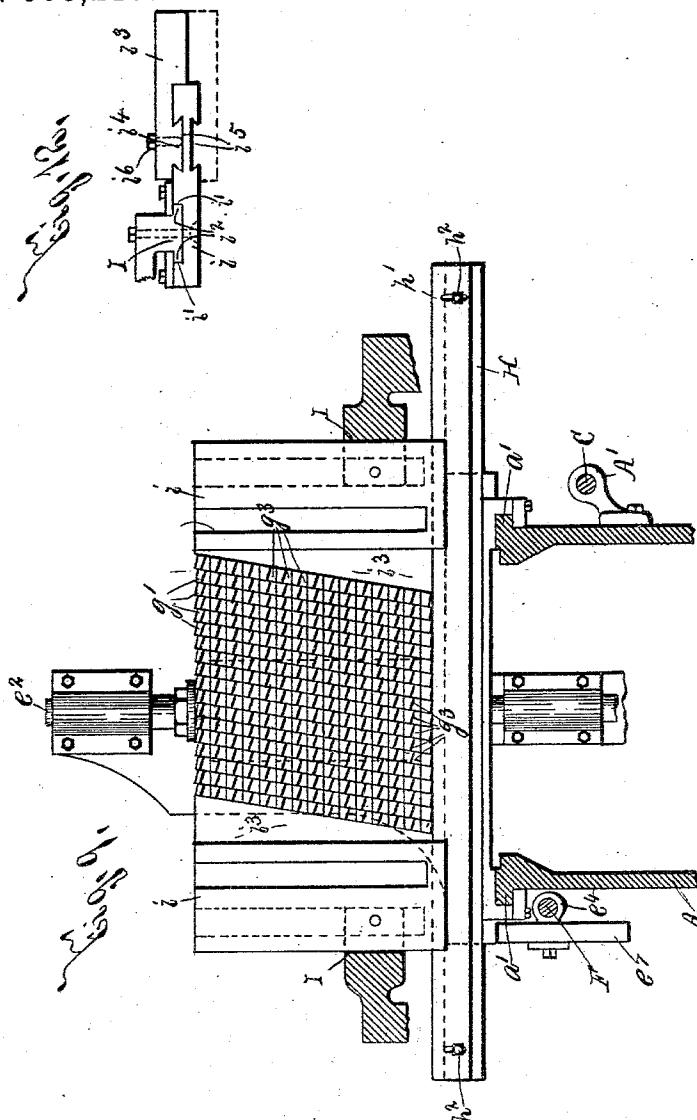
(No Model.)

5 Sheets—Sheet 5.

H. W. MORGAN.
GROOVING MACHINE.

No. 565,213.

Patented Aug. 4, 1896.



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UNITED STATES PATENT OFFICE.

HENRY W. MORGAN, OF ROCHESTER, NEW YORK.

GROOVING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 565,213, dated August 4, 1896.

Application filed June 6, 1894. Serial No. 513,658. (No model.)

To all whom it may concern:

Be it known that I, HENRY W. MORGAN, of Rochester, in the county of Monroe, in the State of New York, have invented new and useful Improvements in Grooving-Machines, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to improvements in grooving-machines of the particular class described in my Patent No. 517,705, of April 3, 1894, and has for its object the production of a simple, practical, and highly effective device for forming dovetailed grooves in the ends of boards or shooks designed to be dovetailed together; and to this end it consists, essentially, in a frame, a support for the lower edges of the boards, shooks, or other articles to be grooved supported on the frame, a rotary cutter-head supported by the frame and having its cutting-face arranged at an angle less than a right angle with the face of said support adjacent to the boards or articles to be grooved, and means for feeding the ends of the boards, shooks, or other articles across the face of the cutter-head.

The invention also consists in the general construction and arrangement of the component parts of my grooving-machine, all as hereinafter more particularly described, and pointed out in the claims.

In describing this invention reference is had to the accompanying drawings, forming a part of this specification, in which like letters indicate corresponding parts in all the views.

Figures 1 and 2 are respectively top plan and side elevation of my improved grooving-machine, having a portion of its frame broken away. Fig. 3 is an enlarged longitudinal vertical sectional view taken on line 3 3, Fig. 1, a box-shook of narrow width being interposed between the cutter-heads. Fig. 4 is an isometric view of four box-shooks similar to those formed by my machine shown as dovetailed together in position for forming a box. Fig. 5 is a longitudinal vertical sectional view similar to Fig. 3, the cutter-heads being shown as separated a greater distance than at Fig. 3. Figs. 6 and 7 are detail elevations of opposite sides of a portion of a side box-

shook and adjacent portions of the knives or saws of the cutter-heads for forming a dovetail groove therein. Fig. 8 is a detail sectional view taken on line 8 8, Fig. 1, the cutter-heads being shown as of the same diameter and as operatively engaged with end shooks of substantially the same size as the ones illustrated at Fig. 4. Fig. 9 is a transverse vertical sectional view taken on line 9 9, Fig. 8. Figs. 10 and 11 are detail elevations of a portion of an end shook and the adjacent portion of the knife or saw of a cutter-head for forming the desired dovetail groove therein. Fig. 12 is a top plan view of a detached clamping-jaw suitable for use with my grooving-machine; and Fig. 13 is a detail vertical sectional view taken on line 13 13, Fig. 1.

The frame A, only a portion of which is here illustrated, is of any desirable form, size, and construction, and is provided with crosswise and lengthwise guides *a a'*, which are of any suitable construction. A carriage B for feeding the boards, shooks, or other articles to be grooved is movable lengthwise of the guide *a*, and may be actuated by any suitable feeding mechanism, here illustrated as a driving-shaft or spindle C, journaled in bearings *A' A'*.

A pinion *C'* is mounted upon the shaft or spindle C and engages a rack *b'* at the lower face of the carriage B. The spindle C may be revolved by a hand-wheel *C²* or suitable power-transmitting mechanism, not necessary to herein illustrate or describe, and, when revolved, reciprocates the carriage B to and fro in the guide *a*.

A bearing *e* and a block *E'*, supporting a second bearing *e'*, are movable lengthwise of the guide *a'*, and are provided with substantially parallel rotary shafts *e² e²*, carrying oppositely-arranged cutter-heads *E E*, consisting of a series of saws or knives arranged one above the other. Any suitable feeding mechanism may be used for reciprocating the bearing *e* and the block *E'* in the guide *a'*, but I have here illustrated a screw *F*, journaled in bearings *A² A²* as connected to said bearing and block for this purpose. The screw *F* is provided with a hand-wheel *F'*, and its extremities are screw-threaded in opposite

directions and are passed through screw-threaded eyes in lugs $e^3 e^4$, projecting from the bearings $e' e'$.

The lug e^3 is rigidly secured to the bearing e and the lug e^4 is movable lengthwise in an upright slot e^6 , formed in an arm e^7 , depending from the bearing e' for permitting endwise or vertical movement of said bearing e' when the bearing e and the block E' are moved toward and away from each other, as presently described.

The lower ends of the shafts $e^2 e^2$ are provided with suitable pulleys $e^8 e^9$, around which power-transmitting belts are passed, and, as clearly illustrated, the pulley e^9 is of considerable width for permitting lengthwise movement of the bearing e' without disengagement of the corresponding belt from said pulley.

The block E' is provided at its upper face with a suitable upwardly-inclining guide E^2 , extending from its inner edge, and the bearing e' is movable lengthwise of the guide E^2 , and is thereby raised and lowered. To effect this movement of the bearing e' , the shaft E^1 is revolved, and the block E' is held stationary by suitable fastening means, as a pin E^3 , registering with perforations $E^4 a^2$, formed, respectively, in the block E' and the frame A . The upward movement of the bearing e' is essential for maintaining the required angle of the opposite sides of the grooves formed by the cutter-heads, and is permitted by the sliding lug e^4 .

If desired, the bearing e' may be fixed to the block E' by suitable fastening means, as a pin E^5 , passed through perforations $E^6 E^7$ in the bearing e' and the block E' , and consequently if the pin E^3 is withdrawn from its operative position and the screw F is revolved the block E' , carrying with it the bearing e' , is moved lengthwise of the guide a' .

When the sides, boards, or shooks g of the box G are being grooved, the pin E^5 is withdrawn from its operative position and the screw F is revolved for separating the bearings $e e'$ the desired distance to permit the passage of the box-shooks g between the cutter-heads $E^2 E^2$, and when the end boards or shooks g' are being grooved the pin E^3 is withdrawn from its operative position and the screw F is revolved for sufficiently separating the bearing e and the block E' . The cutter-heads $E E$ for grooving the side boards or shooks g are formed conical and are arranged with the large end of each opposite the small end of the other, and those for grooving the end boards or shooks g' are formed of substantially the same diameter and are arranged substantially parallel.

The lower edges of the box-shooks are mounted upon suitable supports $H H$ of any desirable form, size, and construction. As here illustrated, these supports are fixed to the bearings $e e'$ by nuts h , and are provided with movable attaching rails or bars $h' h'$, having their opposite ends secured to the supports $H H$ by fastening means, as bolts $h^2 h^2$.

As the bearing e' is elevated the corresponding support H , secured thereto, is similarly elevated, and box-shooks mounted upon the supports $H H$ are arranged at the desired angle for permitting the conical cutter-heads $E E$ to form the required grooves g^2 in their opposite edges.

As clearly seen at Fig. 5, the lower edges of the box-shooks upon the supports $H H$ are arranged at substantially right angles with the cutting-faces of the conical cutting-heads $E E$. The inclination of the lower edges of the box-shooks, as will also be seen upon reference to Fig. 5, is but substantially half as great as the inclination of the guide E^2 of the block E' . This difference in inclination is necessary, owing to the fact that both cutter-heads are simultaneously adjusted and only one moved in an inclined plane.

As the carriage B operates to feed the box-shooks g , arranged at the desired inclination between the conical cutter-heads $E E$, the separate saws or knives of the cutter-heads operate to cut corresponding portions of the dovetail grooves g^2 in the adjacent ends of the box-shooks g , as seen at Fig. 6. The carriage is then retracted, and the box-shooks are reversed end for end and the carriage then operated to again feed the box-shooks g between the cutter-heads for forming the remaining portions of the grooves g^2 therein.

The carriage B is provided with suitable jaws $I I$ for clamping the box-shooks and holding the same in their designed position when passed between the cutter-heads. These jaws are each provided at opposite edges with engaging pieces $i i$, which may be moved vertically, and are provided with grooves or guides i' for receiving ribs or shoulders i^2 upon the main portions of the corresponding jaws I .

It is evident that the angles of the grooves cut by my improved grooving-machine when conical cutting-heads are used and the box-shooks are inclined longitudinally are always uniform irrespective of the amount of separation of the cutter-heads, and that dovetail grooves are quickly and practically formed by forcing the opposite ends of the box-shooks across the cutting-faces of the cutting-heads, then reversing the box-shooks, and again forcing their ends between the cutter-heads.

When desired to cut the grooves in the end boards or shooks g' , the conical cutters $E E$ are removed and others of uniform diameter are substituted. The supports $H H$ are depressed to substantially the same horizontal plane and the fastening-pin E^3 is withdrawn from operative position. The bearing e' is then secured by the fastening-pin E^3 to the block E' , and the cutter-head E and block E' are moved lengthwise of the frame A for effecting the desired separation of the cutter-heads $E E$. The boards or shooks g' , inclined either backwardly or forwardly, as shown at Figs. 9, 10, and 11, from their lower edges upwardly, are interposed between the jaws

I I, and their lower edges are mounted upon the supports H H, and when passed across the cutting-faces of the uniform cutter-heads dovetail grooves g^3 are formed, as clearly seen at Figs. 11 and 12.

The jaws I are provided with removable engaging pieces i^3 , having their adjacent faces arranged substantially parallel and suitably inclined for holding the box-shooks g' at the desired inclination. The engaging pieces i^3 are provided with ribs i^4 , movable in guides i^5 in the engaging pieces $i i$ and are held in operative position by suitable fastening means i^6 . When the end boards, inclined either forwardly or rearwardly, have been passed across the cutting-faces of the cutter-heads E E, the removable engaging pieces $i^3 i^3$ are withdrawn and are oppositely arranged, so that their adjacent faces incline in the reverse direction, and the end boards similarly arranged, as shown at Fig. 11, are clamped between the jaws I I and again passed across the cutting-faces of the cutting-heads.

It will be particularly understood that I do not herein claim any of the features of construction of the grooving-machine set forth in my aforesaid patent, and that I have illustrated and briefly described the means for adjusting the cutter-heads and the carriage, clamping-jaws, and supports for the boards or shooks when being grooved merely for the purpose of elucidating my present invention. It will also be understood that my present invention is not limited to any particular construction of the aforesaid parts.

The operation of my invention will be readily understood upon reference to the foregoing description and the accompanying drawings, and it is evident that it is simple, practical, and highly effective, and provides box-shooks with grooves suitable for dovetailing the shooks together, and thereby forming a box of great strength and desirability. It is evident, however, that considerable change may be made in the general construction and arrangement of the parts of my grooving-machine without departing from the spirit of my invention, and consequently I do not herein specifically limit myself to such exact construction and arrangement.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a grooving-machine, the combination of a frame, a bearing movable along the frame, a rotary shaft journaled in the bearing, a conical cutter-head mounted on the shaft, a support for the articles to be grooved arranged at substantially right angles with the rotary shaft, and means for feeding the articles to be grooved across the face of the cutter-head, substantially as and for the purpose described.

2. In a grooving-machine, the combination of a frame, oppositely-arranged cutter-heads supported by the frame having their adja-

cent sides inclined and arranged substantially parallel with each other, a support for holding the articles to be grooved in an inclined plane, and means for feeding said articles between the cutter-heads, substantially as and for the purpose specified.

3. In a grooving-machine, the combination of a frame, oppositely-arranged conical cutter-heads supported by the frame and arranged with the large end of each opposite the small end of the other, a support for holding the articles to be grooved in an inclined plane, and means for feeding said articles between the cutter-heads, substantially as and for the purpose set forth.

4. In a grooving-machine, the combination of a frame, a bearing movable along the frame, a rotary shaft journaled in the bearing, a support fixed to the bearing for holding the articles to be grooved in an inclined plane, a conical cutter-head mounted on the rotary shaft and having its cutting-face arranged at an angle less than a right angle with the face of the support adjacent to the articles to be grooved, and means for feeding the articles to be grooved across the face of the cutter-head, substantially as and for the purpose described.

5. In a grooving-machine, the combination of a frame, oppositely-arranged bearings supported by the frame and movable along the same toward and away from each other, opposite conical cutter-heads journaled in said bearings and arranged with the large end of each opposite the small end of the other, and a lengthwisely-movable carriage for feeding the articles to be grooved across the adjacent faces of the cutter-heads, substantially as and for the purpose described.

6. In a grooving-machine, the combination of a frame, opposite bearings supported by the frame, one of the bearings being movable toward and away from the other, substantially parallel shafts journaled in the bearings, opposite conical cutter-heads mounted on the shafts and arranged with the large end of each opposite the small end of the other, a support for holding the articles to be grooved in an inclined plane, and means for feeding said articles between the cutter-heads, substantially as and for the purpose set forth.

7. In a grooving-machine, the combination of a frame, a support for holding the articles to be grooved in an inclined plane supported by the frame, a bearing supported by the frame and movable endwise, and toward and away from said support, a cutter-head journaled in the bearing and having its cutting-face arranged at an angle less than a right angle with the face of the support adjacent to the articles to be grooved, and means for feeding the articles to be grooved across the face of the cutter-head, substantially as and for the purpose described.

8. In a grooving-machine, the combination of a frame, a support for holding the articles to be grooved in an inclined plane supported

by the frame, a bearing supported by the frame and movable toward and away from said support in an inclined plane, a cutter-head journaled in said bearing, and means for feeding the articles to be grooved across the face of the cutter-head, substantially as and for the purpose specified.

9. In a grooving-machine, the combination of a frame, opposite bearings supported by the frame, one of the bearings being movable toward and away from the other in an inclined plane, opposite conical cutter-heads journaled in the bearings and arranged with the large end of each opposite the small end of the other, a support for holding the articles to be grooved in an inclined plane, and means for feeding said articles between the cutter-heads, substantially as and for the purpose set forth.

10. In a grooving-machine, the combination of a frame, opposite bearings supported by the frame, one of the bearings being movable toward and away from the other in an inclined plane, opposite conical cutter-heads journaled in said bearings and arranged with the large end of each opposite the small end of the other, a support for holding the articles to be grooved in an inclined plane, and a lengthwisely-movable carriage for feeding the articles to be grooved across the adjacent faces of the cutter-heads, substantially as and for the purpose described.

11. In a grooving-machine, the combination of a frame, a block mounted on the frame, and provided with an inclined guide, a bearing mounted on the block and movable lengthwise of the inclined guide, a cutter-head journaled in the bearing, a support upon the frame for holding the articles to be grooved in an inclined plane, and means for feeding said articles across the face of the cutter-head, substantially as and for the purpose described.

12. In a grooving-machine, the combination of a frame provided with a guide, a block movable lengthwise of the guide and provided with an inclined guide, a bearing mounted on the block and movable lengthwise of the inclined guide, a cutter-head journaled in the bearing, a cutter-head bearing arranged opposite to the former bearing, and means for simultaneously adjusting said bearings toward and away from each other, substantially as and for the purpose specified.

13. In a grooving-machine, the combination of a frame, a block mounted on the frame

and provided with an inclined guide, a bearing mounted on the block and movable lengthwise of the inclined guide, and a conical cutter-head journaled in said bearing, and having its cutting-face arranged at an angle less than a right angle with the lengthwise plane of said guide, substantially as and for the purpose described.

14. In a grooving-machine, the combination of a frame provided with a guide, a bearing supported by the frame and movable lengthwise of the guide, a block mounted on the frame and provided with an inclined guide, a bearing mounted on the block and movable lengthwise of the inclined guide, rotary cutter-heads journaled in said bearings, and means for feeding the articles to be grooved between the cutter-heads, substantially as and for the purpose specified.

15. In a grooving-machine, the combination of a frame provided with a guide, a block movable lengthwise of the guide and provided with an inclined guide, a bearing mounted on the block and movable lengthwise of the inclined guide, and a cutter-head journaled in the bearing, substantially as and for the purpose described.

16. In a grooving-machine, the combination of a frame provided with a guide, a block movable lengthwise of the guide and provided with an inclined guide, a bearing mounted on the block and movable lengthwise of the inclined guide, a cutter-head journaled in the bearing, and means for holding the block stationary during the movement of the bearing, substantially as and for the purpose set forth.

17. In a grooving-machine, the combination of a frame provided with a guide, a block movable lengthwise of the guide and provided with an inclined guide, a bearing mounted on the block and movable lengthwise of the inclined guide, a cutter-head journaled in the bearing, and means for locking the bearing to the block during the movement of the block, substantially as and for the purpose set forth.

In testimony whereof I have hereunto signed my name, in the presence of two attesting witnesses, at Rochester, in the county of Monroe, in the State of New York, this 22d day of May, 1894.

HENRY W. MORGAN.

Witnesses:

CLARK H. NORTON,
E. A. WEISBURG.