D. B. SALSTROM.

CARVING MACHINE.

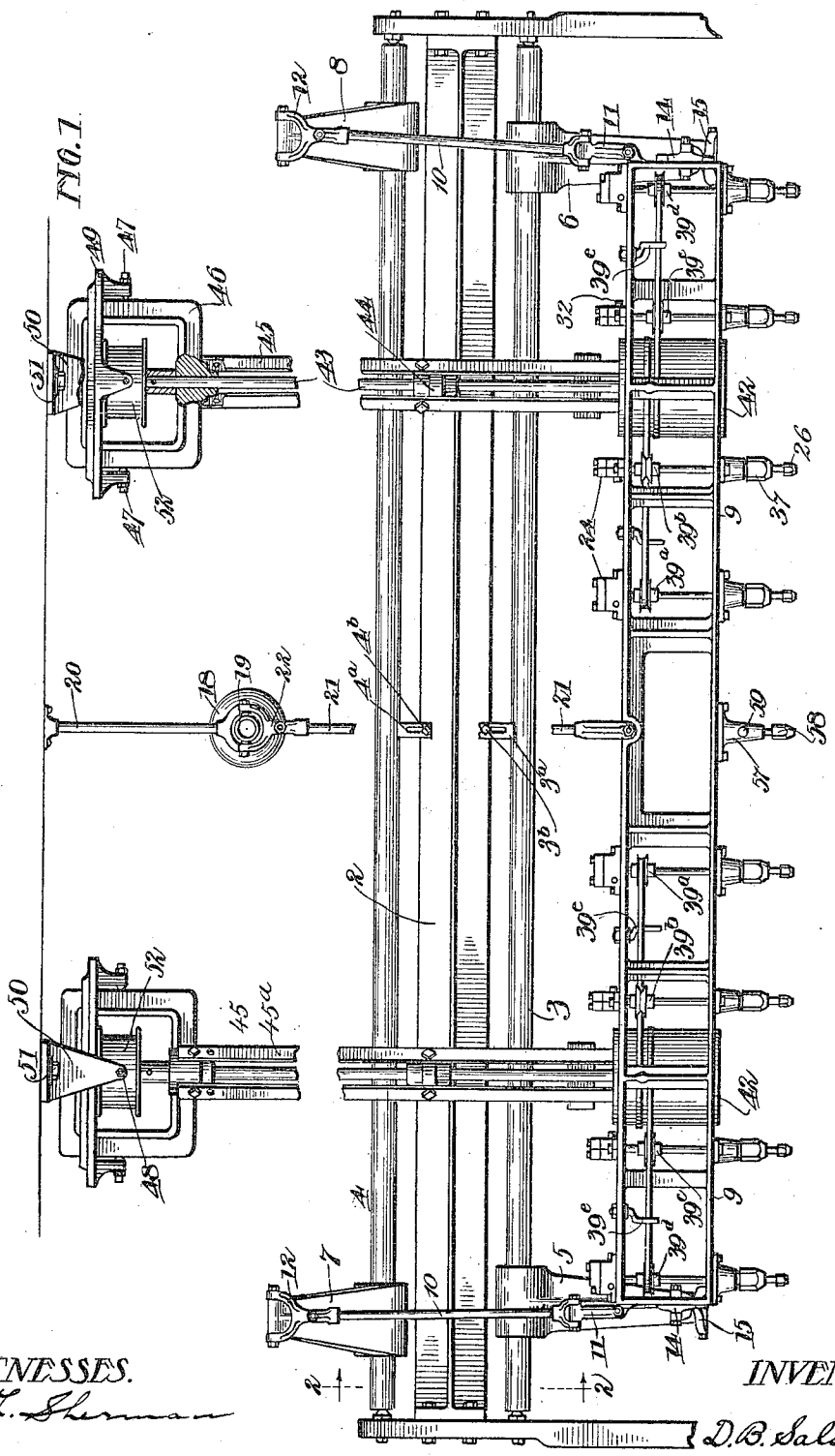
APPLICATION FILED JULY 19, 1906.

957,716.

Patented May 10, 1910.

2 SHEETS—SHEET 1.

FIG. 1.



WITNESSES.

V. L. Sherman

George L. Chindahl

INVENTOR

D. B. Salstrom.

By Luther L. Mills ATTY.

D. B. SALSTROM.

CARVING MACHINE.

APPLICATION FILED JULY 19, 1906.

957,716. Patented May 10, 1910.

2 SHEETS—SHEET 2.

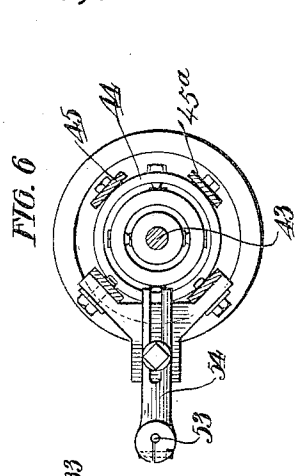


FIG. 6

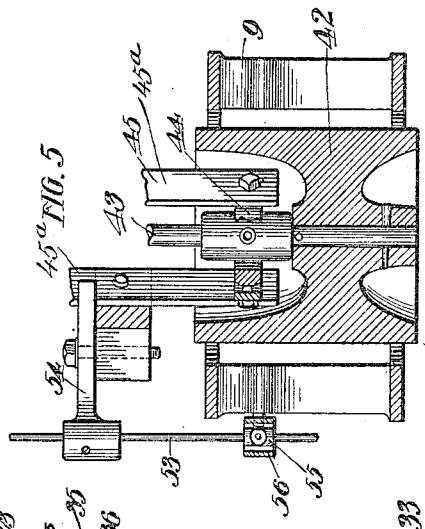


FIG. 5

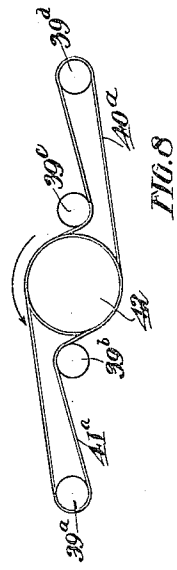


FIG. 8

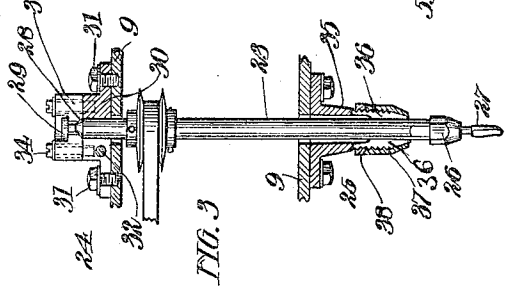


FIG. 3

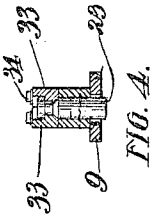


FIG. 4.

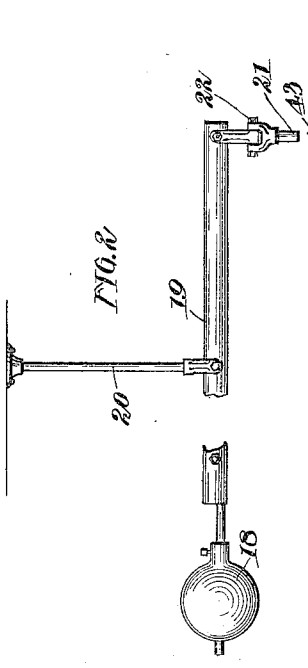
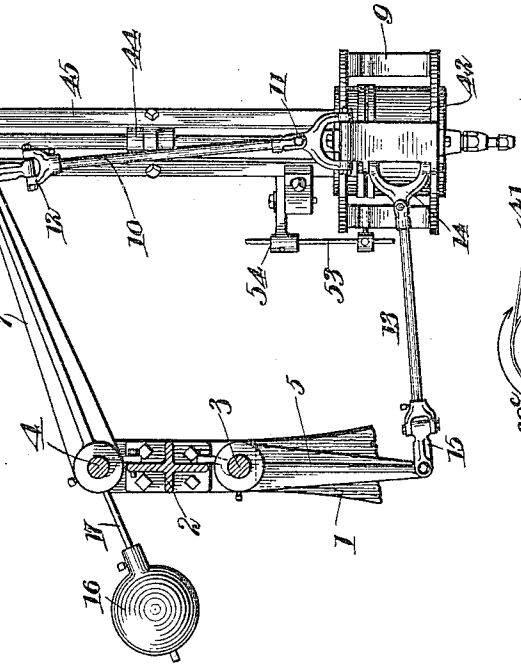


FIG. 2



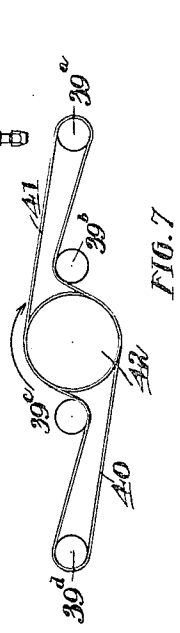


FIG. 7

WITNESSES

V. L. Sherman.

George L. Chindahl

INVENTOR

David B. Salstrom

By Luther L. Miller

ATTY.

UNITED STATES PATENT OFFICE.

DAVID B. SALSTROM, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO EMANUEL KOPRIWA, OF CHICAGO, ILLINOIS.

CARVING-MACHINE.

957,716. Specification of Letters Patent. **Patented May 10, 1910.**

Application filed July 19, 1906. Serial No. 326,834.

To all whom it may concern:

Be it known that I, DAVID B. SALSTROM, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Carving-Machines, of which the following is a specification.

One of the objects of this invention is the production of improved means for "floating" the spindle-carrying head of a multiple-spindle carving machine.

Another object of the invention is the provision of improved means for driving the spindles in such a machine.

Other objects will appear from the detailed description appearing hereinafter.

In the accompanying drawings, Figure 1 is a front elevation of a carving machine embodying the features of my invention, portions of said machine being shown as broken away. Fig. 2 is an end elevation of the spindle-carrying head for supporting the carving tools, and the means for counterbalancing and "floating" said head. Fig. 3 is a view, partly in section, of one of the spindles. Fig. 4 is a sectional view of one of the upper spindle bearings. Fig. 5 is a transverse vertical section through the head and one of the drive pulleys by means of which rotative movement is imparted to the spindles at one end of said head. Fig. 6 is a sectional view through the swinging frame that supports one of the drive shafts. Figs. 7 and 8 are diagrammatic views illustrating the direction taken by the drive belts from the driving drums to the spindle shafts.

In the present embodiment of my invention I provide a supporting frame 1 of any suitable construction, said frame comprising a longitudinal beam 2, in which frame are rotatably supported two longitudinal rock-shafts 3 and 4. The rock shaft 3 carries two arms 5 and 6 rigidly secured to said shaft and extending downwardly therefrom. The shaft 4 likewise carries two arms 7 and 8 rigidly secured to said shaft 4 and extending obliquely forward and upward from said shaft. The rock shafts 3 and 4 are steadied near their middle portions by brackets 3^a and 4^a adjustably secured to the longitudinal beam 2 by means of set screws 3^b and 4^b and extending between said beam and said rock shafts 3 and 4 respectively.

A spindle-carrying head 9 in the form of an open framework is supported upon the frame 1 in such manner that it may be moved freely vertically and in all directions horizontally, said supports, however, being so arranged that the frame shall always be horizontal and parallel with the rock shafts 3 and 4. The head 9 is supported and held in a horizontal position by means of connecting rods 10 extending between the ends of said head and the free ends of the arms 7 and 8, respectively. The rods 10 at their lower ends are joined to the head 9 by means of universal couplings 11 and at their upper ends to the arms 7 and 8 by similar couplings 12. The arms 7 and 8, being rigidly secured to the shaft 4, move together and thus the frame 9 supported by said arms is kept horizontal at all times. To provide for the constant parallelism of the head with reference to the rock shafts 3 and 4 is the function of the arms 5 and 6, said arms being joined to said head at its opposite ends by means of connecting rods 13, said connecting rods comprising universal couplings 14 and 15 at the head and the arms respectively. The head 9 is counterbalanced, in this instance, by a weight 16 carried upon a rod 17 fixed with relation to each of the arms 7 and 8, and by a weight 18 supported upon a lever 19. The lever 19 is pivotally supported, in this instance, by a bracket 20 secured to the ceiling or other suitable support. At its end opposite to that carrying the counter-weight 18 the lever 19 is connected with the middle portion of the head 9 by means of a rod 21. The lower end of said rod is pivotally connected with the head 9, while a universal connection 22 is provided between the upper end of said rod and the lever 19. The rod 21 prevents the head 9 from tilting to any considerable degree, and thereby keeps the tools in a substantially vertical position.

A plurality of spindles 23 (in this embodiment eight in number) are rotatably supported in the head 9 by means of bearings 24 at their upper ends and bearings 25 at their lower ends, said spindles being provided with chucks 26 of ordinary construction for receiving a cutting tool 27. At its upper end each of the spindles 23 is reduced in diameter, forming a conical shoulder 28 and a head 29. The upper bearing 24 comprises a block 30 fastened to the head 9 by

screws 31, said block being split at one end and being there provided with a tightening screw 32 for tightening the block 30 upon the upper part of the spindle 23. The upper bearing 24 also comprises two blocks 33 attached to the block 30 by screws 34, said blocks 33 being recessed upon their adjacent faces to receive between them the shoulder 28 and head 29 of the spindle 23. The openings in the blocks 33 through which the screws 34 extend are of greater diameter than the screws, in order to permit of a sidewise adjustment of the blocks. The blocks 33 bear upon the conical shoulder 28 and the under side of the head 29, thus preventing endwise or lateral movement of the spindle.

The lower spindle bearing 25 comprises a conical radially-slitted portion 35 providing a number of spring fingers 36 surrounding the spindle 23. An internally-tapered sleeve 37 fits upon the lower conical end of the portion 35, said sleeve near its upper end being provided with internal screw-threads adapted to engage with external screw-threads upon the bearing portion 35. A lock nut 38 is adapted to secure the sleeve 37 in position upon the bearing portion 35 and to prevent the accidental rotation of said sleeve. The sleeve 37 upon its outer face is in nut form to adapt it to receive a wrench for turning said sleeve and adjusting the bearing 25.

Within the head 9 and between the bearings 24 and 25 each of the spindles 23 has fixed upon it a pulley 39^a, 39^b, 39^c, 39^d. Power to rotate the spindles 23 is communicated to them by means of four belts 40 and 41 and 40^a and 41^a, said belts running over and around the pulleys 39^a, 39^b, 39^c and 39^d, at each end of the head 9, respectively, said belts being driven by two drums 42. A bent finger 39^e pivotally mounted in the head 9 near the slack side of each of the belts 40, 41, 40^a, 41^a, and arranged to be fixed in adjusted position is adapted to bear against the belt for taking up slack therein. The drums 42 are fixed upon the lower ends of two shafts 43 each supported in bearings 44 in a pendulum frame 45. The frame 45 comprises bars 45^a rigidly secured at their lower ends to the outer ring member of the lowest bearing 44. The upper end of the frame 45 is rigidly attached to a yoke 46, and said yoke being adapted to have a universal swinging movement by being supported in a gimbal-bearing formed by the two pairs of cone bearing-screws 47 and 48. the former pair of screws being supported in a ring frame 49 and the latter pair in an inverted supporting yoke 50. The yoke 50 is secured to the ceiling or other suitable support above the carving head 9 by means of lag bolts 51.

A pulley 52 is fixed upon the upper end of each of the shafts 43 at the oscillatory center of the gimbal-bearing upon which said shaft is supported, and in position to receive a belt (not shown) from any suitable source of power. The drums 42 are suspended freely within openings in the carving head 9 save that they are held from sidewise movement with relation to said head by means of a guide rod 53 rigidly secured to the rear side of each pendulum frame 45 by means of a bracket 54, said rod passing loosely through a sleeve 55, which sleeve is supported by a gimbal-bearing 56 carried by the carving head 9.

Near its middle portion and extending downwardly from its lower side the carving head 9 is provided with a socket piece 57 adapted to receive the shank of a chuck 58 for the tracer (not shown) said shank being adjustably secured in the socket piece 57 by means of a thumb screw 59. As in other carving machines, this tracer is employed to follow the pattern and thereby to guide the cutting tools at the lower ends of the spindles 23.

The work-table upon which the pattern and the pieces to be carved are secured is not shown in the drawings, as my invention does not relate thereto. Any of the common forms of table may be employed in the construction of a wood-carving machine embodying my invention.

In operation, cutting tools of the proper kind are secured by means of the chucks 26 to the lower ends of the spindles 23, all of said tools being of the same form, and care being taken that they project to a uniform distance below the head 9. The pieces of wood to be carved are secured by any suitable means to the work-table (not shown) beneath the cutting tools 27, and a pattern (completely carved to the extent at least of the operation intended) is clamped upon the table beneath the tracer 58.

Power is communicated by means of a belt (not shown) to the pulleys 52 at the upper ends of the shafts 43, and to the spindle 23 by means of the belts 40, 41, 40^a, 41^a, passing over the drums 42 and the pulleys 39^a, 39^b, 39^c, 39^d. The belt 40 runs over the drum 42 to the pulley 39 and beside the pulley 39^c, contacting the last mentioned pulley sufficiently to rotate its spindle. The belt 41 passes over the drum 42, around the pulley 39^a, and beside the pulley 39^b, contacting said last mentioned pulley sufficiently to drive its spindle 23. At the opposite end of the head 9 the belt 40^a and 41^a run over the drum 42 and over and beside the pulleys 39^a and 39^b and the pulleys 39^c and 39^d, respectively. This arrangement and direction of travel of said belts produces a rotation of all the cutting tools 27 in the proper direction to operate upon the material to be carved.

The head 9 may be freely moved forward and back, from side to side, and up and down, without disturbing its horizontality or its parallelism with the shafts 3 and 4.

The method hereinbefore described of supporting and driving the spindles 23 is adapted to reduce vibration of the spindles 23 to a minimum. Such vibration is highly objectionable in a wood-carving machine, as it results in giving the work a rough, pitted surface. It will be observed that the bearings 24 and 25 for the spindles 23 are placed relatively far apart, thereby assisting to prevent vibration of the spindles. This end is further promoted by means of the adjustable bearings 24 and 25. Said bearings may be adjusted, as hereinbefore described, to take up wear and prevent vibration and endwise movement of the spindles.

In operation, the rapid rotation of the spindle tends in time to loosen the hold of the blocks 33 upon the spindle 23. It has been found in practice that merely tapping said blocks causes them to move sufficiently to hold the upper end of the spindle steady between them. It will also be noted that the necessity for long driving belts has been obviated, thus eliminating a common source of vibration in carving machines as heretofore constructed.

The spindle bearing herein shown and described is claimed in application Ser. No. 400,510 filed by me on Nov. 4, 1907.

I do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

I claim as my invention:

1. In a carving machine, in combination, a drive shaft suspended by one end and arranged to swing; a head adapted to be moved bodily with relation to said shaft; spindles in said head; and a driving connection between the other end of said shaft and said spindles.

2. In a carving machine, in combination, a movable spindle-carrying head; spindles in said head; a drive shaft for the spindles, arranged to move forward and back and from side to side; independent supports for said head and said shaft; and a driving connection between said shaft and said spindles.

3. In a carving machine, in combination, a vertical drive shaft; a support for said shaft permitting the lower end of the shaft to swing forward and back and from side to side; a head arranged to have a vertical movement independently of said shaft; spindles in said head; and a driving connection between said shaft and said spindles.

4. In a carving machine, in combination, a spindle-carrying head arranged to have a vertical movement; a rotatable drive shaft; a gimbal bearing for said shaft, said head being bodily movable with relation to said shaft; spindles in said head; and means for communicating motion from the shaft to the spindles.

5. In a carving machine, in combination, a stationary gimbal bearing; a rotatable drive shaft suspended from said bearing in a substantially vertical position; a spindle-carrying head supported adjacent to the lower end of said shaft and bodily movable with relation to said shaft; spindles in said head; and means for communicating motion from said shaft to the spindles.

6. In a carving machine, in combination, a supporting frame; a spindle-carrying head; means for counterbalancing said head; means for holding said head parallel to the supporting frame; a rotatable drive shaft arranged to have a swinging movement, said head being adjacent to one end of said shaft, and being bodily movable with relation to said shaft; spindles in said head; and means for communicating motion from the shaft to the spindles.

7. In a carving machine, in combination, a supporting frame; a spindle-carrying head; spindles in said head provided with pulleys; means for counterbalancing said head; means for holding the head parallel to the supporting frame and in a horizontal position; a drive shaft arranged to have a swinging movement forward and back and from side to side, said head being bodily movable with relation to said shaft; a drum fixed on the drive shaft; and belts adapted to run over said drum and said pulleys.

8. In a carving machine, in combination, a rotatable drive shaft and a spindle-carrying head arranged at substantially right angles to each other; spindles in said head; pulleys on said spindles, said head being movable longitudinally of said shaft; a drum on said shaft within said head; and a belt adapted to run over said drum and said pulleys.

9. In a carving machine, in combination, a stationary gimbal bearing; a rotatable drive shaft suspended from said bearing in a substantially vertical position; a spindle-carrying head adjacent to the lower end of said shaft, and extending at substantially right angles to said shaft; means for supporting said head to move longitudinally of said shaft; spindles in said head; and means for communicating motion from said shaft to said spindles.

10. In a carving machine, in combination, a stationary gimbal bearing; a rotatable drive shaft suspended from said bearing in a substantially vertical position; a spindle-carrying head extending at substantially right angles to said shaft; means for supporting said head to move forward and back, from side to side, and up and down; spindles in said head; pulleys on said spindles; a drum fixed to said shaft within said head;

and belts adapted to run over said drum and said pulleys.

11. In a carving machine, in combination, a supporting frame; two parallel rock shafts in said frame; a spindle-carrying head; two forwardly-extending arms of equal length fixed to one of said shafts; two connecting rods of equal length connected at their ends to said arms and said head by universal couplings; two downwardly extending arms of equal length fixed to the other rock shaft; two connecting rods of equal length connected at their ends to said downwardly-extending arms and said head by universal couplings; means for counterbalancing said head; spindles in said head; and means for driving said spindles.

12. In a carving machine, in combination, a drive shaft arranged to swing forward and back and from side to side; a spindle-carrying head arranged to move forward and back, from side to side, and up and down; a bracket arranged to swing with said shaft; a guide rod fixed in said bracket; a guide sleeve through which said rod extends; a gimbal bearing fixed to said spindle-carrying head for supporting said sleeve; spindles in said head; and means for communicating motion from said shaft to the spindles.

13. In a carving machine, in combination, a spindle-carrying head arranged to move forward and back, from side to side, and up and down; a drive shaft extending at right angles with said head; a drum on said shaft within said head; two spindles in said head at each side of said drum; and two belts communicating motion from said drum to said spindles, each belt extending around said drum to the farther one of the spindles driven by said belt, and running at one side of the other spindle.

14. In a carving machine, in combination, a head; means located centrally of said head for supporting a tracer; four pairs of alined spindle-bearings on said head at each side of said tracer-supporting means, one bearing of each pair of bearings being at the upper side of the head and the other bearing at the lower side thereof; spindles in said bearings; two independently-actuated spindle-driving members located within said head, one at each side of the center of said head; driving connections between each of said spindle-driving members and the four spindles at its end of the head; and means for supporting and counterbalancing said head.

15. In a carving machine, in combination, a spindle-carrying head; two groups of four spindles each in said head; a separate drive shaft for each of said groups of spindles; driving connections between each shaft and its group of spindles; and independent supports for said head and said shafts.

16. A carving machine comprising a head; means for movably supporting said head; spindles in said head; a driver connected with a plurality of spindles and located adjacent to said spindles; and means, independent of the support for the head, for movably supporting said driver.

17. A carving machine comprising a head; means for movably supporting said head; spindles in said head; a driver connected with a plurality of spindles and located adjacent to said spindles; means, independent of the support for the head, for suspending said driver to swing; and means for causing said driver to follow said head in certain of the movements of the latter.

DAVID B. SALSTROM.

Witnesses:
L. L. MILLER,
GEORGE L. CHINDAHL.