April 5, 1932. L. WIEDEN 1,852,387

WOODWORKING MACHINE

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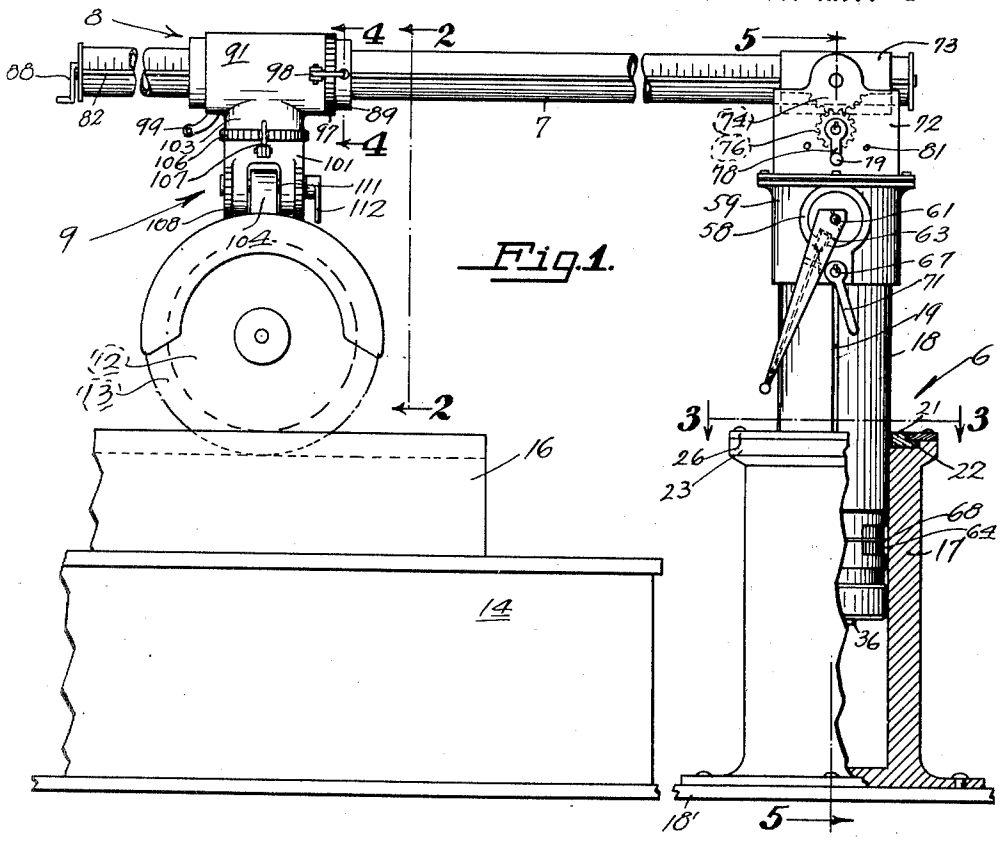

Fig. 1.

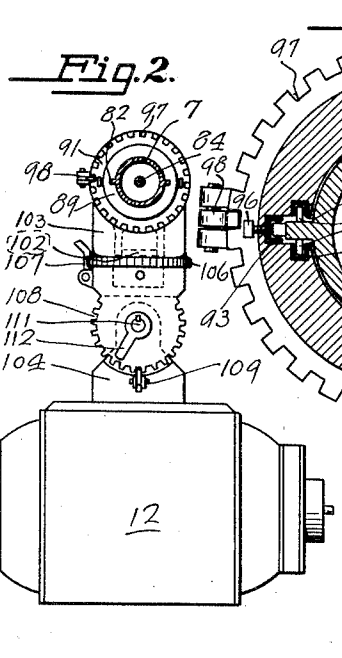

Fig. 2.

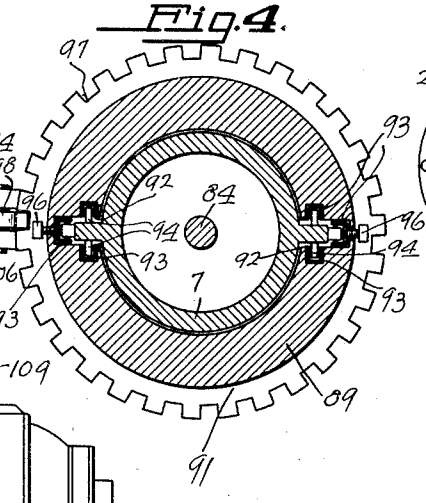

Fig. 4.

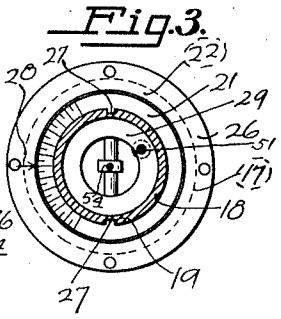

Fig. 3.

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WOODWORKING MACHINE

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Fig 5.

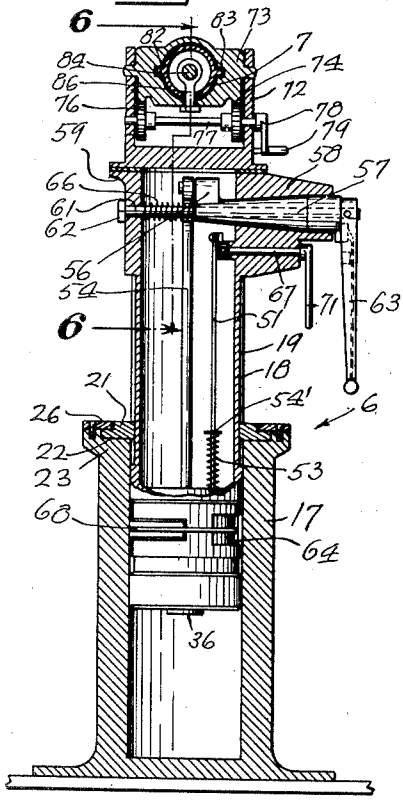

Fig.9.

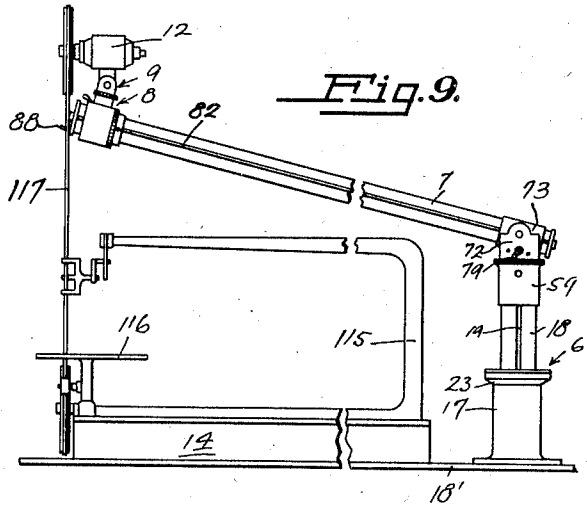

Fig.10.

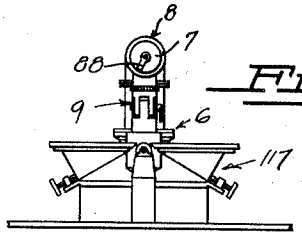

Fig.8.

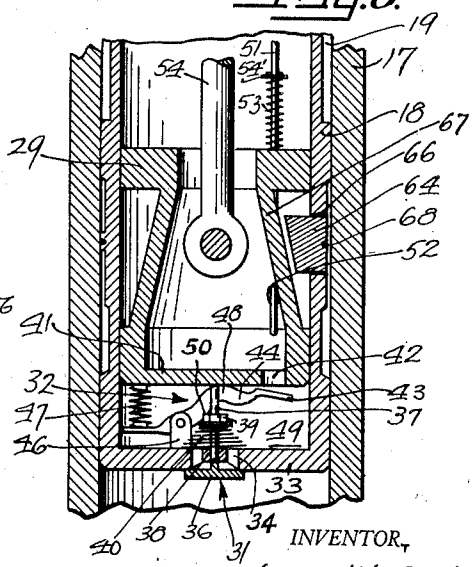

Fig.6.

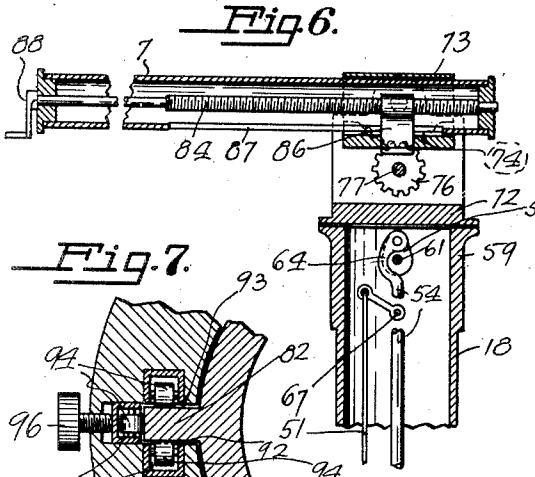

Fig.7.

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Patented Apr. 5, 1932 1,852,387

UNITED STATES PATENT OFFICE

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WOODWORKING MACHINE

Application filed February 8, 1930. Serial No. 426,859.

This invention relates to universal wood-working machines.

It is the primary object of the invention to provide a wood-working machine which is adapted to support a tool in various operating positions so that different operations and types of cuts may be performed by the same machine, with great facility and ease.

Particularly it is an object of the invention to provide a universally adjustable standard for wood-working tools, wherein the prime mover of the tool, such as an electric motor, is adjustably mounted on a carriage, which carriage is in turn, axially and rotatably adjustable on a comparatively long rocking arm, the protruding length and angular position of said arm being readily and positively determined in an arm support, by axial displacement, and by angular elevation thereof; the support itself is rotatable and is adapted to be raised and lowered in a fixed standard; in connection with all the adjustable joints, means is provided to lock the respective joints and the parts connected thereby, in the adjusted positions thereof. By adjusting the positions of the carriage, the arm, and of the support, the tool may be held in a desired position in relation to a work table or bench, to perform the required operations on the work, such as cutting, ripping, miter cuts, band-saw cuts, or joining and the like.

Another object of the invention is the provision of a hydraulically raised and lowered tool support for machines of the character described; operating mechanism being provided thereon to allow accurate adjustment of the height of the tool supports.

Other objects and advantages are to provide a universal wood-working machine that will be superior in point of simplicity, inexpensiveness of construction, positiveness of operation, and facility and convenience in use and general efficiency.

In this specification and the annexed drawings, the invention is illustrated in the form considered to be the best, but it is to be understood that the invention is not limited to such form, because it may be embodied in other forms; and it is also to be understood that in and by the claims following the description, it is desired to cover the invention in whatsoever form it may be embodied.

The invention is clearly illustrated in the accompanying drawings wherein

Fig. 1 is a side elevation of the machine constructed in accordance with my invention, showing the same in operative relation to the work.

Fig. 2 is a sectional view of the arm, showing the arrangement of the tool carriage thereon, the section being taken on the line 2—2 of Fig. 1.

Fig. 3 is a sectional view of the support for the tool carrying arm, the section being taken on the line 3—3 of Fig. 1.

Fig. 4 is a sectional view, on a large scale, of the carriage mounting on the arm.

Fig. 5 is a vertical sectional view of the machine, the section being taken on the line 5—5 of Fig. 1.

Fig. 6 is a fragmental vertical sectional view of the machine, the section being taken on the line 6—6 of Fig. 5.

Fig. 7 is a fragmental view of the bearing on the arm on which the sleeve of the carriage is guided.

Fig. 8 is a sectional view of the hydraulic plunger and piston therein showing the operating valve arrangement thereof.

Fig. 9 is a side elevation of the machine as arranged in operative relation to a band saw; and

Fig. 10 is a front view of the machine in operative relation to a joiner table or bench.

In its general organization the invention consists of an axially and rotatably adjustable standard 6, upon which is mounted an arm 7, with freedom of axial and pivotal adjustments. On the arm is slidable a carriage 8, which carries a motor mounting 9. An electric motor 12 is adjustably held by said mounting and is adapted to drive a desired tool, such as a circular saw 13. The aforementioned parts of the structure are disposed to regulate the position of the electric motor 12, and of the tool thereon, relatively to a table or bench 14 upon which a piece of work 16 rests.

The standard 6 is built on the hydraulic

jack principle. A hydraulic cylinder 17 is fixedly supported on a base 18'. The bottom of the cylinder 17 is closed so as to hold a fluid, such as oil or water, therein.

A plunger 18 is reciprocable in the cylinder 17. The plunger 18 is cylindrical and has diametrically opposed axial grooves 19 on the periphery thereof. A graduated ring 21 is disposed in a recess 22 in the top flange 23 at the open end of the cylinder 18. The ring 21 has an annular flange 24 thereon reduced in thickness, over which is secured a retaining ring 26, so as to rotatably hold the ring 21 in place. On the inner periphery of the ring 21 are formed keys 27 that extend into the grooves 19 so as to operatively connect the plunger 18 with the graduated ring 21. The retainer ring 26 has a marker 28 thereon as shown in Fig. 3, which indicates on the graduations of the ring 21, the angular displacement of the plunger 18.

The movement of the plunger 18 into and out of the cylinder 17 is accomplished by the use of a pump piston 29 adjacent the lower closed end of the plunger 18, as clearly shown in Fig. 8.

The raising and lowering of the plunger 18 is accomplished by reciprocation and pumping action of the piston 29 therein. The piston 29 cooperates with valves 31 and 32, whereby the flow of fluid is regulated from one side of the plunger bottom 33 to the other side thereof. The valve 31 is disposed in a central aperture 34 in the bottom 33. A valve head 36 of said valve 31 has a valve stem 37 extending therefrom thru the aperture 34 and into the plunger 18. The aperture 34 has a spider structure therein, the hub 38 of which is the guiding bearing of the stem 37. On the stem 37 is fixed a nut 39 and between the nut 39 and the top of the spider bearing 38 is disposed a compression spring 40, to urge the nut 39 upwardly thereby firmly seating the valve head 36 against the lower face of the plunger bottom 33 so as to normally close the aperature 33. The free end of the stem 37 extends into operative relation to the bottom of the piston 29.

The piston 29 is closed at the bottom 41 thereof excepting an eccentrically located passage 42 therein. This passage 42 is adapted to be closed by a valve disc 43 formed on the free end of a lever 44, which is pivoted intermediate its ends in a bracket 46 fixed on the inner face of the plunger bottom 33. Against the other end of the lever 44 bears a coil spring 47 which is disposed between the said second end of the lever 44 and the piston bottom 41. The lever 44 is formed with a bump or protuberance 48 adjacent the valve disc 43, against which the piston bottom 41 abuts, whereby the valve disc 43 is normally held spaced from the passage 42, allowing the passing of the fluid therethru. It is to be noted that both the afore-described valves 31 and 32 have their actuating mechanisms disposed within the chamber 49 between the plunger bottom 33 and the piston bottom 41.

In operation there is fluid both in the cylinder 17 and within the hollow plunger 19. In order to raise the plunger 18, the pump piston 29 is reciprocated. When the piston 29 is raised, the fluid flows thru the passage 42 into the chamber 49. After the piston 29 is raised a certain distance, the piston bottom 41 is drawn away from the bump 48 of the lever 44 and the valve disc 43 is seated by the action of the spring 47 on the other end of the lever 44. At the return stroke of the piston 29, the valve 32 being closed, the fluid is prevented from escaping from the chamber 49 thru the passage 42. The return stroke of the piston 29, therefore, builds up a pressure in the chamber 49 which forces the valve head 36 away from the plunger bottom 33 and urges the fluid under pressure, thru the aperture 34 into the space beneath the plunger bottom 33. The increase of fluid volume and pressure in the cylinder 17 below the plunger 18, raises the plunger 18. When the fluid pressures in the chamber 49 and below the plunger bottom 33 are equalized, the spring 40 brings the valve head 36 into engagement with the plunger bottom 33, thereby closing the valve 31. The afore-described pumping operation is repeated until the plunger 18 is raised to the desired height. The piston 29 must be so operated that its downward stroke ends when the piston bottom 41 abuts against the top of the valve stem 37, and its upward stroke is terminated after the valve 32 is closed.

In order to lower the plunger 18, the piston 29 is pressed downwardly so as to press the valve stem 37 and the valve head 36 downwardly, thereby opening the valve 31. Inasmuch as the valve 32 is kept open at this time, by the bump 48 thereof, the fluid is permitted to escape from beneath the plunger 18 thru the aperture 34 and the passage 42, and flow into the plunger 18 and above the piston 29. The resulting reduction of fluid volume and pressure allows the plunger 18 to lower into the cylinder 17. The plunger 18 lowers by its own weight, during this operation, urging the fluid thru said open aperture 34 and the passage 42. When the plunger 18 reaches the desired, lowered position, the piston 29 is raised and returned to its neutral position, as shown in Fig. 8.

In some instances it is required to lower the plunger 18, very gradually and accurately. This adjustment is to be effected step by step with very short drops. To accomplish this adjustment the lever 44 is so formed as to abut at a point 50, against the top of the nut 39, so that if the valve disc 43 is urged downwardly beyond the neutral position shown in Fig. 8, the lever engages the nut 39 to move

the stem 37 downwardly, whereby the valve 31 is opened permitting the escapement of fluid from beneath the plunger bottom 33. The valve 31 is opened only for short durations and then released, causing a comparatively small drop of the plunger 18 in the cylinder 17. This short valve opening is performed by moving a rod 51 against the valve disc 43 at will. The rod 51 is guided in an aperture 52 thru the piston 29 and is normally urged away from the valve disc 43 by means of a compression spring 53 disposed between the top of the piston 29 and a fixed washer 54′ on the rod 51, above the top of the piston 29. The repeated lowering and raising of the rod 51 into and out of engagement with the valve disc 43, effects the lowering of the plunger 18 step by step, of any short duration desired.

The operation of the pump piston 29 is achieved thru a connecting rod 54 connected at one end thereof to the piston 29. The other end of the connecting rod 54 is pivoted on an eccentric crank 56 of a conical crank sleeve 57, the latter fitting in a corresponding bearing 58 formed on the head 59 of the plunger 18. The sleeve 57 is rotatable on a shaft 61, extending across the plunger head 59. An end of the shaft 61 has a nut or head 62 thereof outside of the plunger head 59. On the other end of the shaft 61 is a handle 63 to rotate the crank sleeve 57. The end of the connecting rod 54 which is pivoted to the crank 56, has a curved bend 64 therein, as shown in Fig. 6, to allow the swinging movement thereof past the shaft 61. A coil spring 66 around the shaft 61 within the plunger head 59, limits the movement of the sleeve 57 into the head 59.

When the handle 63 is rotated in clockwise direction viewing Fig. 1, the connecting rod 54 and the piston 29 are moved downwardly, while the rotation of the handle 63 in the opposite direction raises the piston 29. In order to lock the piston 29 in an uppermost position, an arcuate wedge block section 64 is disposed in a slot 66 of the plunger 18, so as to be radially slidable in said slot 66. The outer periphery of the wedge 64 is a section of a cylinder, the inner periphery thereof is an inclined surface, corresponding to a conical inner wall 67 of the piston 29. The conical wall 67 tapers upwardly, consequently, if the piston 29 is raised sufficiently high to bring the wall 67 into engagement with the inclined surface of the wedge 64, the wedge 64 will be pressed radially outward, and thus jammed against the inner wall of the cylinder 17, to lock the piston in this position. The wedge 64 is prevented from accidental sliding toward the cylinder wall by means of a spring ring 68 extending all around the periphery of the plunger 18. In normal operation the piston 29 is not pulled upwardly so far as to engage the wedge 64, unless the locking of the plunger 18 is desired.

The upper end of the rod 51 is pivotally connected to an auxiliary crank shaft 67 supported in a bearing in the plunger head 59, at a point below the crank sleeve 57. A handle 71 on the outer end of the crank shaft 67 is rocked back and forth to operate the rod 51 and effect the step by step, gradual lowering of the plunger 18.

By the afore-described instrumentalities the plunger 18 may be raised by repeated pumping by the piston 29, and lowered either by depressing the piston 29, or by repeatedly depressing the rod 51 onto the valve disc 43. The plunger 18 can be locked in position by raising the piston 29 sufficiently high to jam the wedge into engagement with the inner periphery of the cylinder 17. The adjustment of the plunger 18 determines the height of the position of the parts supported on the plunger 18.

On the plunger head 59 is fixedly secured a bearing box 72 in which is transversely secured a trunnion block 73 adapted to be moved around its pivots to various angular positions. On the bottom side of the block 72 at each end thereof, is formed a toothed segment 74, for engagement with a meshing gear 76. The gears 76 are fixed on a transverse shaft 77, an end of which extends outside of the bearing box 72 and has a crank 78 thereon. The handle 79 of the crank 78 is adapted to be inserted into holes 81 in a wall of the bearing box 72, thereby to lock the gears 76 against rotation and to hold the block 73 in adjusted angular positions.

The arm 7 is slidably disposed in the block 73. On each side of the arm 7 is a long, axially disposed key 82. The keys 82 are slidable in keyways 83 in the block 72, whereby the arm 7 is held against rotation. The arm is pivotally elevated or lowered by the turning of the crank 77 and gears 74 to the desired degree, so as to hold the block 72 and the arm 7 therein, at the required angularity.

The axial movement of the arm 7 is controlled by the use of a threaded bar 84 which extends throughout the hollow arm 7, and is journaled in the opposite ends of the arm 7. The bar 84 is supported in a threaded bracket 86, which latter is fixed on the block 72 so as to extend into the interior of the arm 7. An elongated slot 87 is cut in the wall of the hollow arm 7 in registry with the bracket 86, so as to allow axial movement of the arm 7 in the block 72. The axial movement of the arm 7 is effected by the rotation of the bar 84, an end of which extends outside of the free end of the arm 7 and has a crank handle 88 thereon, whereby the bar 84 is rotated. In this manner the length of the protruding portion of the bar 84 is determined, and the bar 84 is arranged and held in the required angular position, at a desired height.

The carriage 8 is constructed of a sliding sleeve 89, and a rotary sleeve 91 arranged outside of the sliding sleeve 89. The sliding sleeve 89 has diametrically opposite keyways 92 on the inner periphery thereof, into which extend the respective keys 82 on the side of the arm 7. In the three sides of each keyway 92 are formed parallel axial channels 93, one in each side. In each channel 93 are mounted rollers 94 to bear against the respective sides of the keys 82. The rollers 94 may be tightly pressed against the sides of the respective keys 82 by means of set screws 96 extending thru the wall of the sliding sleeve 89.

The rotary sleeve 91 is shorter than the sliding sleeve 89. On the outer periphery of the rotary sleeve 91 is fixed a toothed ring 97. On the outer periphery of the rotary sleeve 91 is a pivoted latch or pawl 98 for engagement with the teeth of the ring 97, to hold the rotary sleeve 91 in any adjusted position. By rotating the sleeve 91 the motor mounting 9 and the motor 12 may be held projecting in different angular positions from the arm 7. For instance, in Fig. 1 the motor is below the arm 7, and in Fig. 9 the motor is securely held above the arm 7. A short handle 99 on the rotary sleeve 91 facilitates the handling of the carriage.

The mounting 9 is a universally adjustable joint so that the motor may be arranged in parallelism with the arm 7, or at an angle thereto in a parallel plane, or at an angle to the arm 7 in a plane intersecting that of the arm.

A yoke 101 is secured by a vertical pivot or king-pin 102 to a depending portion 103 of the rotary sleeve 91. Between the legs of the yoke 101 is pivoted a lug 104 which extends from the casing of the motor 12. Thus the mounting is adjustable around the pin 102, and at right angles to said pin around the pivot of the lug 104. A cogged wheel 106 on the portion 103 is detachably engaged by a pawl or latch 107 on the yoke 101 to fix the mounting in a certain adjusted position. The legs of the yoke 101 terminate in quadrants 108, which cooperate with latches 109 on the opposite sides of the lug 104, to hold the motor 12 against accidental movement around the pivot of the lug 104. The lug pivot comprises a pin 111 fixed to the lug and journaled in the legs of the yoke 101. A short handle 112 is provided on an end of the pin 111 to facilitate adjustment of the mounting.

The tool connected to the motor 12 is brought above a desired point of the bench or table 14 by rotating the plunger 18 in the cylinder 17 to a desired degree. Then the height of the support can be adjusted by raising or lowering the plunger 18 in the cylinder 17, in the manner heretofore set forth.

Next the angularity of the arm 7 is adjusted by turning the handle 78 to the required position. Thereafter the length of the arm 7 is adjusted by rotating the handle 88. The carriage 8 is then slid and rotated to have the motor secured on the required side of the arm 7, whereupon the mounting 9 is adjusted to accurately center the tool on the work, both as to location, and as to direction of cut or other operation. In this manner the saw 13, for instance, may be held in position for cutting, or ripping operations. By adjusting the angularity of the mounting and the motor location, the same machine is ready to perform a miter cut. This universal arrangement allows the same motor, and in many instances, the same saw to be used for nearly all the operations commonly performed by a saw on woodwork.

In Fig. 9 the motor 12 is disposed above the arm 7, and the arm 7 is elevated to a highermost position. The plunger 18 is also raised to the maximum height of operation. Thus space is left between the table 14 and the motor 12 to allow the placing of a band-saw guide support 115 and a work table 116 below the end of the arm 7. A band-saw 117 is connected to the motor 12 in the usual manner, and is aligned accurately to perform all the operations on a work that is to be performed by a band-saw.

In Fig. 10, the entire mechanism is shown in its lowered position so that the saw 13 of the machine is in alignment with a joiner 117 of the usual type. For this adjustment the tool must be brought endwisely to the joiner 117, which is greatly facilitated by the axial sliding of the arm 7.

In similar manner the machine heretofore described may be adjusted for connection, and aligned, with different work, and operates different tools, to perform any wood working operation required. The different work tables for the various operations may be arranged in a circle around the machine, if so desired, and the motor and the proper tool thereon can be readily brought around into alignment, selectively, with either table or work, performing many various operations on wood work with great efficiency, and economy.

Having thus described this invention, what I claim and desire to secure by Letters Patent is:

1. In a machine of the character described a vertically and rotatably adjustable support, a tool supporting arm, means on the support to mount the arm thereon with freedom of axial and pivotal adjustment; a carriage on the arm adapted to be adjusted axially thereon and angularly therearound; and a tool driving unit universally mounted on said carriage to hold the tool connected thereto in registry with a piece of work, in a position determined by the adjustments of the support of the arm, and of the carriage.

2. In a machine of the character described

a support, a tool supporting arm adjustably mounted thereon; a carriage on the arm, comprising a sliding sleeve on the arm, a sleeve rotatable on the sliding sleeve, and means to secure the rotatable sleeve on the sliding sleeve in any adjusted, angular position; and a tool driving unit mounted on the rotatable sleeve to hold and drive a tool in a position relative to a piece of work, determined by the adjustments of said arm and said carriage.

3. In a machine of the character described a support, a block transversely pivoted on said support, a hollow arm slidably held in said block, a threaded member having a crank handle on an end thereof and extending axially thru said hollow arm, a fixed internally threaded bracket on said block to threadedly engage said member, said arm being adapted to be axially moved thru said block as the said member is rotated; an adjustable carriage on the arm, and a tool driving unit mounted on said carriage to drive a tool connected thereto, and to support the same in alignment with a piece of work, as determined by the adjustment of said arm, and of said carriage.

4. In a machine of the character described a support, a tool supporting arm adjustably mounted thereon, a carriage on the arm adapted to be adjusted axially and angularly thereon, a yoke depending from said carriage, being pivoted at right angles to the axis of the arm, a tool driving unit pivoted transversely in said yoke to drive and support a tool in operative position to a piece of work, in a position determined by the adjustment of the yoke in the carriage, and of the unit on the yoke; means to secure the yoke in adjusted position, and means to secure the unit in its adjusted position.

5. In a machine of the character described a support, a block transversely pivoted on said support, a hollow arm slidably held in said block, a threaded member having a crank handle on an end thereof and extending axially thru said hollow arm, a fixed internally threaded bracket on said block to threadedly engage said member, said arm being adapted to be axially moved thru said block as the said member is rotated; an adjustable carriage on the arm, and a tool driving unit mounted on said carriage to drive a tool connected thereto, and to support the same in alignment with a piece of work, as determined by the adjustment of said arm, of said carriage, said carriage comprising a sliding sleeve on the arms, a sleeve rotatable on the sliding sleeve, and means to secure the rotatable sleeve to the sliding sleeve in any adjusted angular position, said driving unit being mounted on the rotary sleeve.

6. In a machine of the character described a support, a block transversely pivoted on said support, a hollow arm slidably held in said block, a threaded member having a crank handle on an end thereof and extending axially thru said hollow arm, a fixed internally threaded bracket on said block to threadedly engage said member, said arm being adapted to be axially moved thru said block as the said member is rotated; an adjustable carriage on the arm, a tool driving unit mounted on said carriage to drive a tool connected thereto, and to support the same in alignment with a piece of work, as determined by the adjustment of said arm, and of said carriage; means to mount the driving unit on the carriage comprising a yoke depending from said carriage being pivoted at right angles to the axis of the arm, said driving unit being pivoted transversely in said yoke, means to secure the yoke in position, and means to fix the driving unit in adjusted position.

In testimony whereof I have hereunto set my hand at Livermore, California, this 13th day of December, 1929.

LOUIS WIEDEN.