Sept. 6, 1932. W. F. ZIMMERMANN 1,875,910

DUAL CONTROL FOR UNIVERSAL WORKTABLES

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Fig. 1.

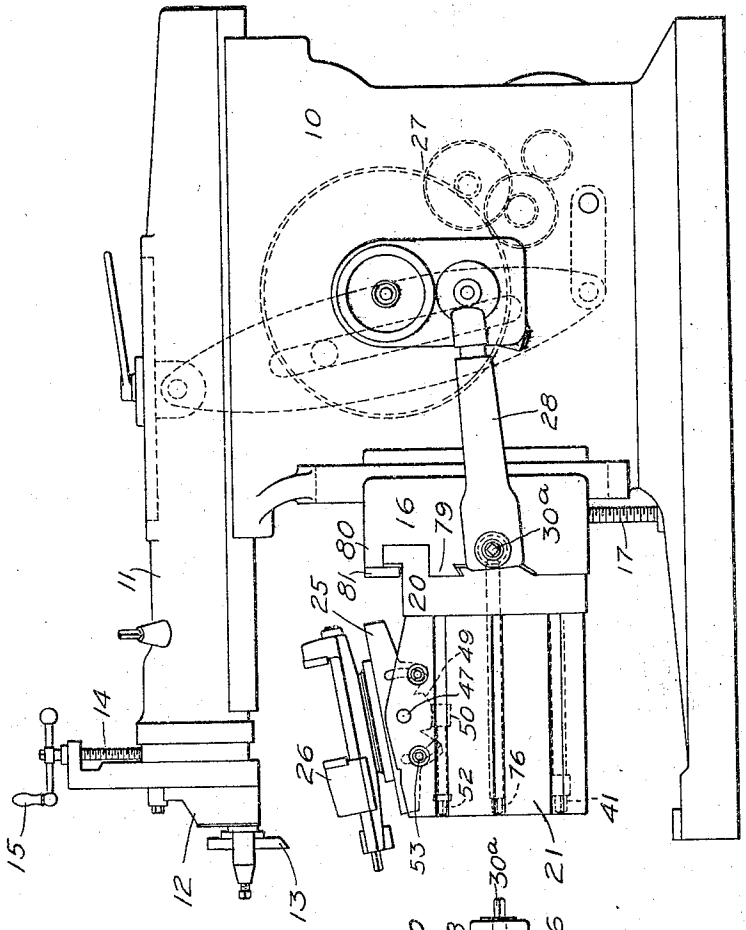
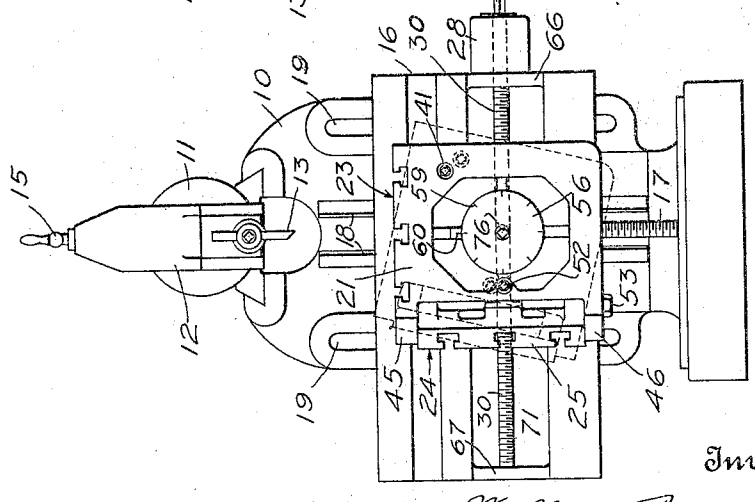


Fig. 2.



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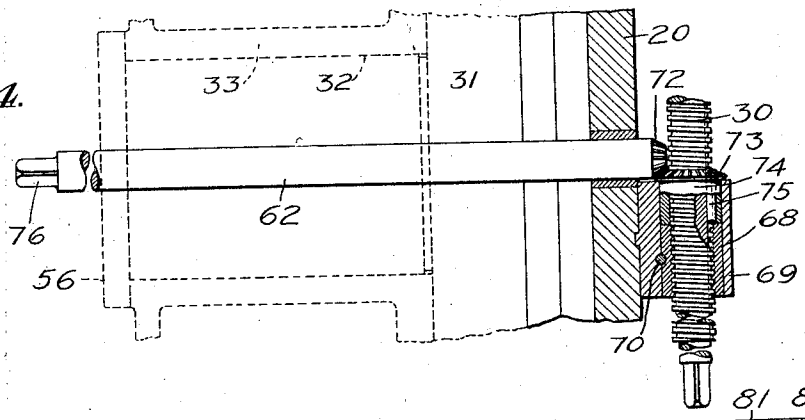
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Fig. 4.



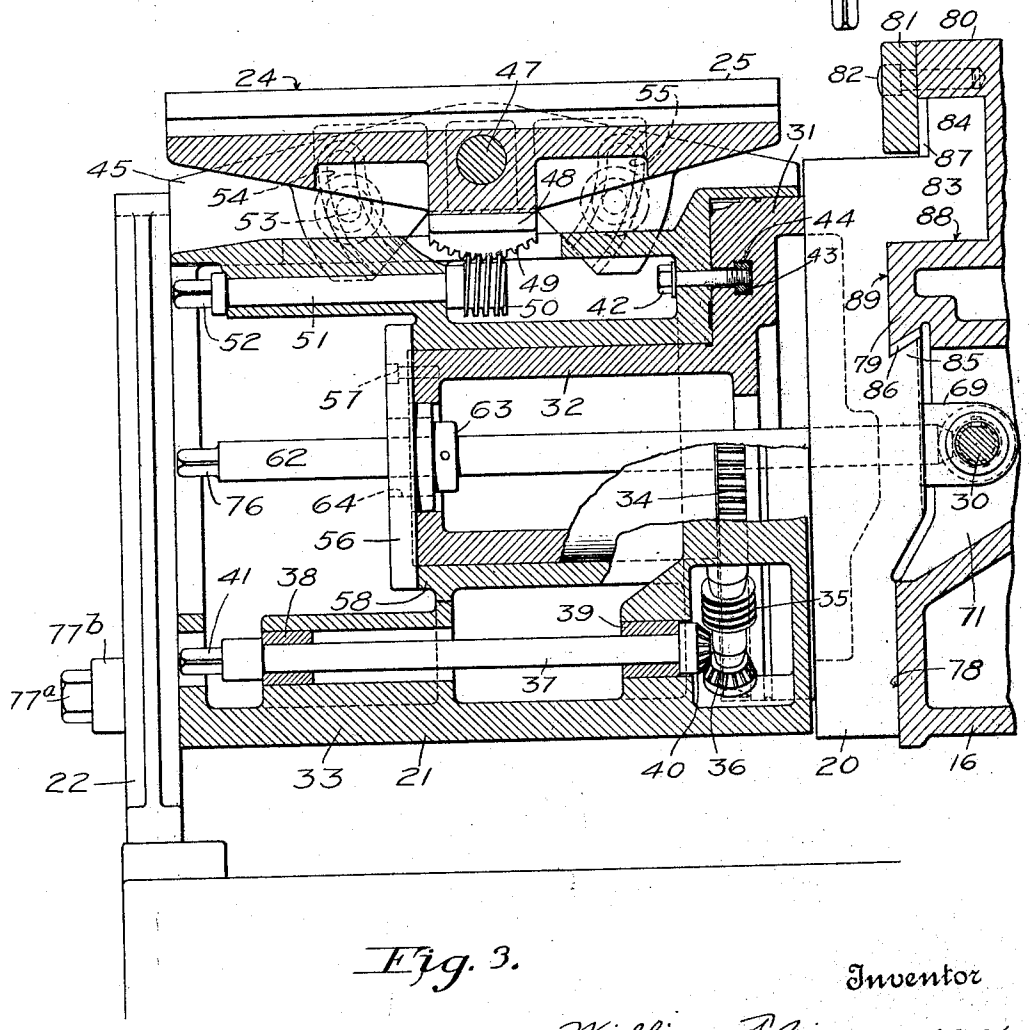


Fig. 3.

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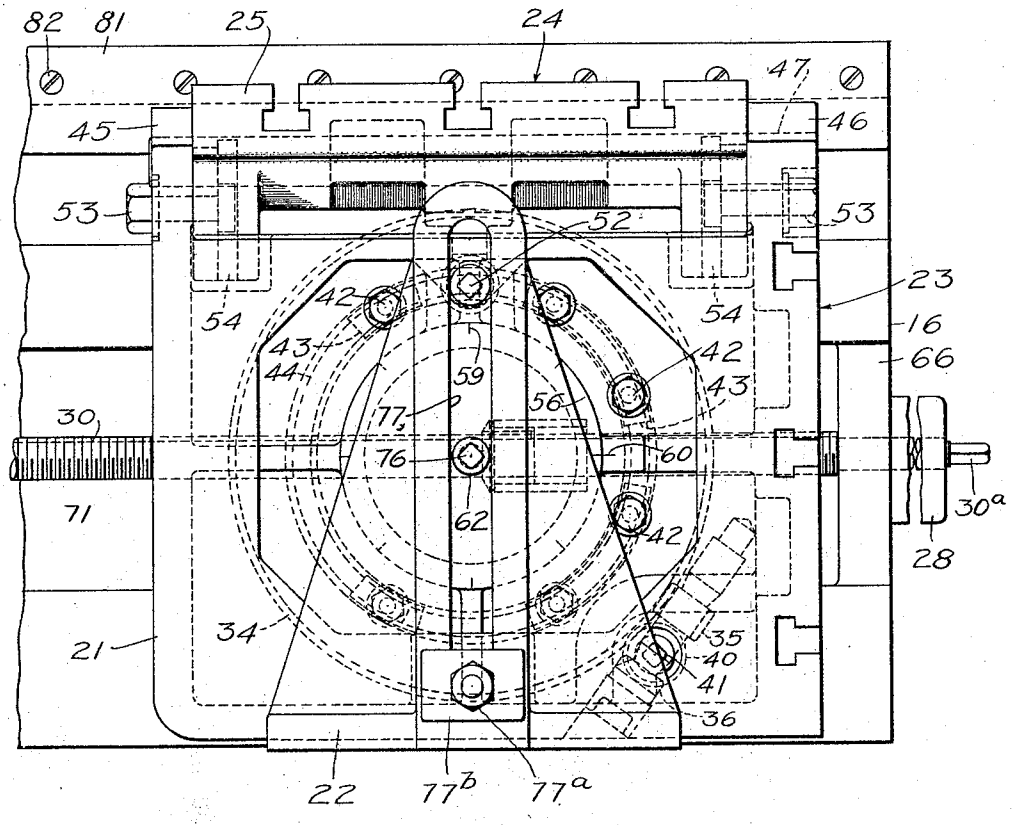
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Fig. 5.



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UNITED STATES PATENT OFFICE

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DUAL CONTROL FOR UNIVERSAL WORKTABLES

Application filed October 8, 1927. Serial No. 224,990.

The invention disclosed herein relates to certain improvements in shaping machine tools and in its more specific aspects to a dual control means incorporated in a shaper having a universal work table thereon, the dual control means being designed to translate the universal table along the rail and having features whereby it may be controlled from a plurality of conveniently positioned points.

The type of the machine tool referred to consists in general of a frame having a horizontally reciprocating ram mounted thereon carrying a cutting tool at its outer end. The frame also has mounted thereon for vertical movement a cross rail which in turn supports thereon the translatable work table.

In machines of this type the various controls have included means located at the outer end of the cross rail for manually adjusting the table along the cross rail and also a manual means located on the head of the reciprocating ram for vertically adjusting the cutting tool thereon.

In machining certain surfaces it is common practice for the operator to perform each of the above mentioned adjustments simultaneously. During such adjustments it is necessary for the operator to maintain a close watch on the work and the relation of the cutting tool thereto. In former machines, it has been found difficult to perform each of the above functions since the position of the adjusting means has been such that the operator's view is considerably obscured or that he must assume a very uncomfortable and tiresome position and one which could not be maintained for any great period of time. Attempts have heretofore been made to provide an auxiliary table adjusting means at the outer end of shaper tables but such means were inconvenient to operate in that when one adjusting means was operated the other one was required to be locked. This step was troublesome and therefore often not resorted to with the result that it to a large extent remained a single control means as in the preceding devices.

The invention herein disclosed is designed to overcome these difficulties and is especially adapted for use in combination with work tables having a plurality of adjustments commonly known as a universal work table. The provision of dual control means in a table of this type presents problems not encountered in a simple rigid table mounted for translation only. The universal work table includes a saddle mounted on the cross rail, a main work carrier mounted to be swivelled about an axis transverse, to the cross rail and having incorporated on one surface thereof, which in certain adjusted positions of the table is the upper horizontal surface, an auxiliary tiltable fixture adapted to carry the work.

The novel dual control means consists of a screw shaft rotatably mounted longitudinally of the cross rail and operable at an outer end of the cross rail either manually or by power means and has in addition other control means consisting of a shaft mounted concentric with the work table and in such a manner that its position is not changed by swivelling the work table.

In machines of this type it is often desirable to supply the shaper tool with an auxiliary support comprising a bracket adapted to be secured to the outer end of the work table. One of the features of this invention includes the idea of so arranging the concentric adjusting shaft that it may be operated easily through a slot in the supporting bracket which slot also serves the purpose of supporting a clamping bolt therein for securing the bracket to the universal table in its vertically adjusted positions.

The adjusting features on a universal work table include means for swivelling the table, means for tilting the auxiliary table and the above mentioned means for adjusting the table along the cross rail. The arrangement in this invention is such that each of these adjusting means is conveniently located adjacent each other and operable from the outer end of the work table.

The embodiment of this invention as disclosed in the present application includes a type of rail and table construction which is peculiarly well adapted for the incorporation therein of the type of dual control means forming a primary feature of this invention.

This table support and guide means are arranged in a novel manner such as to eliminate the bowing and distortion of rails which occurs in the prior constructions and makes provision for an opening extending the length of the rail adapted to receive elements of the dual control mechanism without sacrificing any of the features of rigidity of construction in the cross-rail sought.

Other objects and advantages will be in part indicated in the following description and in part rendered apparent therefrom in connection with the annexed drawings.

To enable others skilled in the art so fully to apprehend the underlying features hereof that they may embody the same in the various ways contemplated by this invention, drawings depicting a preferred typical construction have been annexed as a part of this disclosure and, in such drawings, like characters of reference denote corresponding parts throughout all the views, of which:—

Figure 1 is a vertical side view of a shaper showing the invention incorporated therein. Fig. 2 is a front elevational view looking from the left in Fig. 1. Fig. 3 is a vertical cross sectional view of the universal table showing the adjusting means and an outer supporting bracket omitted in Fig. 1. Fig. 4 is a portion of a horizontal section taken through the horizontal adjusting means for the table and Fig. 5 is an enlarged front view of the table showing many of the details of construction not found in Fig. 2.

The invention is shown incorporated in a shaper having the general features consisting of a frame 10, a ram 11 mounted for horizontal reciprocation thereon, the outer end of the ram having a vertically adjustable slide 12 thereon carrying the cutting tool 13, such vertical adjustment being accomplished by the screw shaft 14 rotatable by means of the hand lever 15.

The forward face of the frame has mounted for vertical movement thereon the cross rail 16 adjustable in a well known means including the vertical screw shaft 17. The cross rail slides in the vertical guides 18 and is clamped in position by clamping bolts projecting through the vertical slots 19 in a conventional manner.

A saddle 20 is translatably secured on the cross rail 16 which saddle in turn carries the work table 21 having an auxiliary outer support 22 therefor. The work table 21 is provided with two working faces 23 and 24, the working face 24 including a tilting element 25 having a vise 26 secured thereon as shown in Fig. 1 or it is obvious the work may be directly assembled on the tilting element 25.

The conventional elements include a gear train 27 adapted to reciprocate the ram 11 and through suitable mechanism, indicated generally at 28, to impart an intermittent rotary motion to the screw shaft 30 mounted in the cross rail.

As shown most clearly in Fig. 3 the saddle 20 has integral therewith or secured thereto a frame portion 31 having a projecting hub or drum portion 32 upon which the table frame 33 is rotatably mounted. The rotation is accomplished by means of the large gear 34 formed on the stationary member 31 and having in mesh therewith the worm member 35 rigid with or secured to the bevel gear 36. The worm and bevel gear are mounted on a shaft in the frame 33. Rotation of the bevel gear 36 is accomplished by means of the adjusting shaft 37 mounted in the rotary portion of the table by means of the bearings 38 and 39 and having at its inner end the bevel gear 40 meshing with the bevel gear 36. The outer end of the shaft has a squared portion 41 adapted to receive a manually operated crank. The rotary table frame 33 is secured on the hub 32 by means of the bolts 42 threadably engaged in the segmental plates 43 shown in dotted lines in Fig. 5 and as shown in Fig. 3 located within the T-shaped openings 44 which T-shaped openings are formed on a radius concentric with the drum 32.

The means for tiltably supporting the plate 25 and securing it in adjusted positions include the upstanding journal brackets 45 and 46 adapted to support the rigid shaft 47 which in turn also carries the table element 25. The table element 25 has fixed thereto the bracket 48 provided with a gear segment 49 at the inner end thereof adapted to be engaged by the worm 50 secured to the shaft 51 mounted in the rotatable portion of the table and having at its outer end the squared portion 52 adapted to receive a manually operable lever similar to the squared end 41. The tilting table element 25 is clamped in its adjusted positions by means of the clamping bolts 53 secured in the journal brackets 45 and 46 and projecting through the arc shaped openings 54 and 55 on each side of the tilting element.

Additional means for securing the table on the drum 32 include the circular plate 56 secured by means of bolts 57 to the outer end of the drum 32 and having a projecting annular portion adapted to engage the flange portion 58 of the table. As shown most clearly in Fig. 2 the circular plate 56 is provided with graduations 59 adjacent which moves the graduation mark 60 on an element fixed to the table.

Concentrically mounted within the drum 32 and the table is the shaft 62 secured against outward movement by any simple means such as the collar 63 fixed thereto and bearing against the bushing 64 secured within the plate 56. The novel dual adjustable means for translating the table along the cross rail include the screw shaft 30 rotatably mounted in the end bracket members 66 and

67 of the cross rail. A squared end 30[a] is provided on the outer end of shaft 30 for the reception of a hand crank. Engaging with the screw shaft is the nut 68 fixed against rotation and longitudinal movement in the bracket 69 by means of the pin 70 which bracket 69 is secured to the saddle portion of the table and is adapted to move along the screw shaft in the opening 71 as the screw shaft 30 is rotated. The adjusting shaft 62 is connected thereto by means of the bevel gearing 72 and 73, the bevel gear 73 being fixed to the collar 74 which in turn is splined to the shaft 30 by means of the key 75. The outer end of the shaft 62 has a squared portion 76 adapted to receive a crank inserted through the vertical slot 77 of the supporting bracket 22.

The table may be rotated about its axis in the manner heretofore described and secured in the position shown in Fig. 1 or that shown in Fig. 2 or an intermediate position similar to that shown in dotted lines in Fig. 2. Such rotation of the table however does not move the adjusting shaft 62 which remains stationary and concentric therewith and with its outer end projecting to a point adjacent the slot 77 such that an actuating crank may be applied therethru. The slot 77 also receives the clamping bolt 77[a] cooperating with the plate 77[b] to secure the table in its vertically adjusted positions.

The advantages afforded by the dual control may be seen by inspection of Figs. 1 and 2. The operator, with the present arrangement, ordinarily stands at the right of the table as shown in Fig. 2 with his right hand grasping the lever 15 and using the left to actuate the shaft 62. In such a position the operator would have a constant and an unobstructed view of the work mounted on the table. This is in great contrast to the uncomfortable position the operator would be required to assume if it were necessary to actuate the shaft 30 with the left hand adjacent the outer end of the cross rail. It is clear also that the operator would not be able to stand close to the work especially if the table were moved to a position near the left end of the rail as shown in Fig. 2. These advantageous features are accomplished in a universally adjustable work table without sacrificing any of the features of its adjustability as previously described. As another point in connection with the dual control which should be noted is the specific construction of the connection between the two adjusting means whereby they may be alternately actuated without the necessity of resorting to locking the particular one which is not being immediately utilized.

An ususually rigid and strong supporting means for a heavy work table of this type is required and novel means therefore have been conceived and made adaptable to cooperate with the dual actuating means. Such a construction consists of a cross rail having the lower bearing plate surface 78 against which the lower end of the work table constantly bears and an upper guiding means consisting of a projecting ledge member 79 having integral therewith the overhanging or projecting portion 80 which in turn has integral therewith or rigidly secured thereto the plate 81 by means of screw bolts 82. Within the opening formed by these elements a projecting portion 83 of the work table extends having the inner upturned end 84 adapted to closely fit in the opening. The under surface of the ledge member 79 is engaged by the projecting portion 85 of the work table or saddle, such engaging surfaces being inclined inwardly and upwardly. An adjustable gib member 86 is inserted between these inclined surfaces and likewise an adjustable gib member 87 is positioned in the rear of the plate 81. The construction disclosed affords a solid integral member for guiding the table on the rail, the upward forces being taken by the lower inclined surface of the projecting ledge 79 and the upper surface 88 thereof being adapted to carry the projecting portion 83 of the saddle. The screw adjusting means and its required opening therefore extending longitudinally of the rail is positioned below the guiding means and it is apparent therefore that the guiding structure is not thereby weakened by insertion therebetween of the long unsupported opening required by the adjusting screw. The guiding surfaces are therefore practically freed from any disposition to bow and to thereby destroy the relation of the guiding surfaces with an attendant loosening of the securing means.

Any tendency of the table to turn in a counterclockwise direction in Fig. 3 causes the overhanging hook portion of the guide to firmly engage the upturned portion 84 of the table saddle and cause the surface 88 to firmly engage the upper flat surface of the ledge member and the projecting portion 85 to likewise engage the under surface of the ledge in a more firm manner. As a result of the inclined surface on the projection 85 and also the upturned portion of the table saddle 84, normal working forces acting on the table would tend to more firmly draw the table saddle into engagement with the surface 89 of the ledge member and the co-acting surfaces to be more firmly locked on the ledge member. By providing the upturned portion 84 and an overhanging hook portion on the rail rather than having the table hook over the rail as in many prior constructions the advantages pointed out above are accomplished and in addition a longer lever arm is provided for resisting the turning movement normally imparted to the work table, such lever arm being equal to the distance

from the upturned portion 84 to a point near the lower part of the bearing plate 78.

The above described cross rail and table construction is especially advantageous in conjunction with the dual control means in that it permits the latter to be mounted in such a position that the actuating shaft 62 may be extended out through the supporting drum and concentric therewith.

Without further analysis, the foregoing will so fully reveal the gist of this invention that others can, by applying current knowledge, readily adapt it for various utilizations by retaining one or more of the features that, from the standpoint of the prior art, fairly constitute essential characteristics of either the generic or specific aspects of this invention and, therefore, such adaptations should be, and are intended to be, comprehended within the meaning and range of equivalency of the following claims.

Having thus revealed this invention, I claim as new and desire to secure the following combinations and elements, or equivalents thereof, by Letters Patent of United States:—

1. A shaper combining a frame; a cross-rail mounted thereon; a saddle translatably mounted on said cross-rail; a trunnion extending outwardly from said saddle; a table rotatably mounted on said trunnion; means, including an actuating shaft extending lengthwise of said table and having its operating end accessible from the end of the table, for rotating the table on said trunnion; a tiltable supporting member pivotally mounted on said table; means carried by and rotatable with said table and including an actuating shaft having its operating end accessible from the end of the table for tilting said supporting member in the various angular positions of said table; means for translating said saddle along said cross-rail including a non-rotatable nut carried by said saddle, a rotary feed screw journaled lengthwise of said cross-rail and having a threaded engagement with said nut, said feed screw being provided with a projecting end adapted to receive an actuating crank to effect rotation of said screw and thereby translation of said table; and auxiliary means for rotating said feed screw to effect translation of said table, said auxiliary means including a shaft journaled coaxial with said trunnion and having an end adjacent the end of said table adapted to receive an actuating crank, and a splined gear connection between the other end of said shaft and said feed screw.

2. A shaper combining a frame; a cross-rail mounted thereon; a saddle translatably mounted on said cross-rail; a trunnion extending outwardly from said saddle; a table rotatably mounted on said trunnion; a supporting bracket secured to the outer end of said table and extending above the axis of said trunnion and having a vertical slot therein; means, including an actuating shaft extending lengthwise of said table and having its operating end accessible from the end of the table, for rotating the table on said trunnion; a tiltable supporting member pivotally mounted on said table; means carried by and rotatable with said table and including an actuating shaft having its operating end accessible from the end of the table for tilting said supporting member in the various angular positions of said table; means for translating said saddle along said cross-rail including a non-rotatable nut carried by said saddle, a rotary feed screw journaled lengthwise of said cross-rail and having a threaded engagement with said nut, said feed screw being provided with a projecting end adapted to receive an actuating crank to effect rotation of said screw and thereby translation of said table; and auxiliary means for rotating said feed screw to effect translation of said table, said auxiliary means including a shaft journaled coaxial with said trunnion and in alignment with the slot in said supporting bracket having an end adjacent the end of said table adapted to receive an actuating crank passed through said slot, and a splined gear connection between the other end of said shaft and said feed screw.

In witness whereof, I have hereunto subscribed my name.

WILLIAM F. ZIMMERMANN.