Jan. 23, 1940. S. MADSEN 2,188,053

ASSEMBLING DEVICE

Filed Aug. 23, 1937 3 Sheets-Sheet 1

Fig. 1.

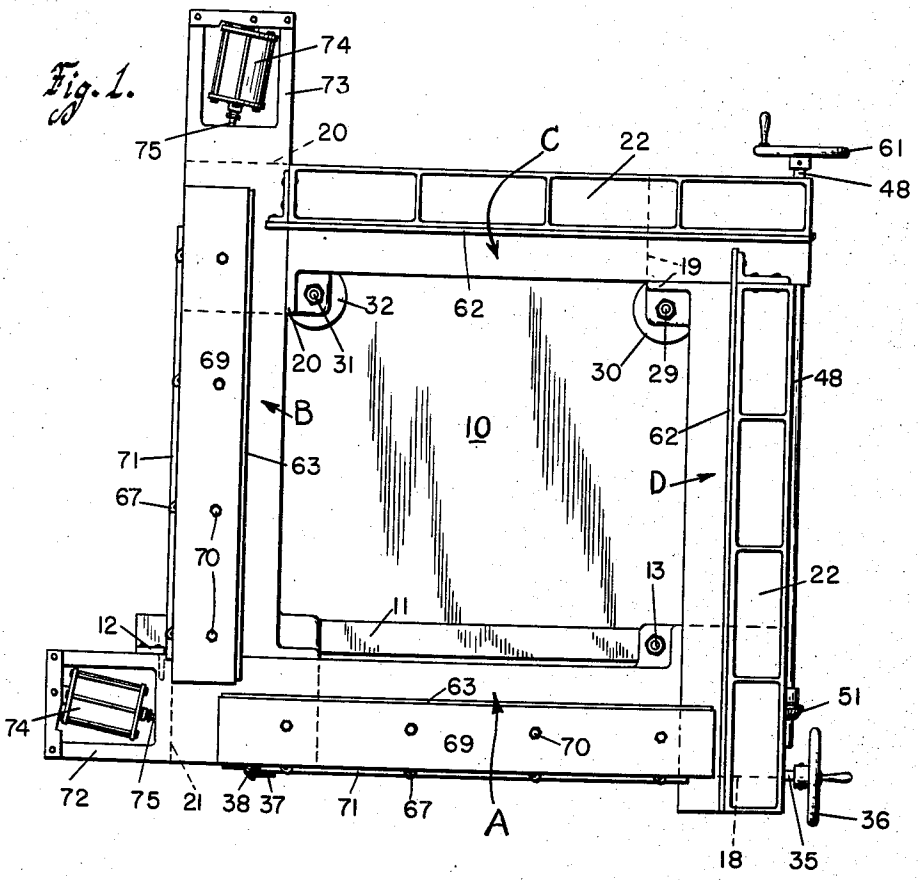
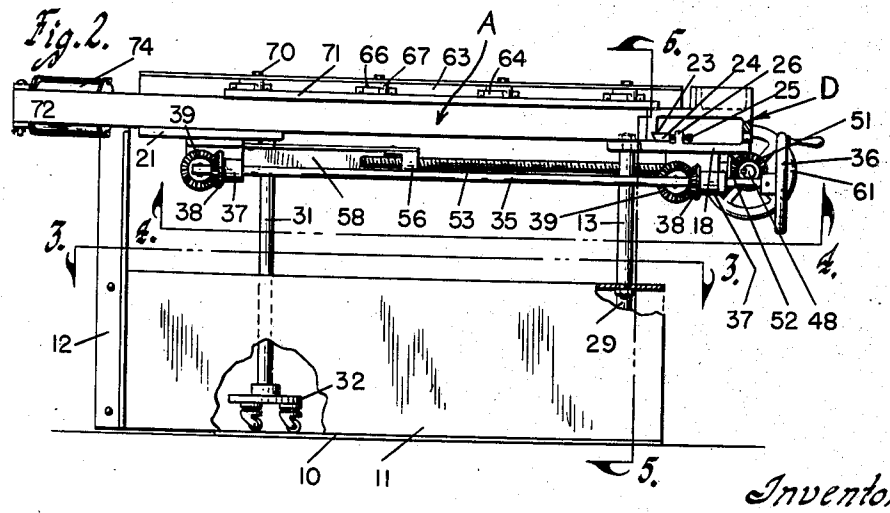


Fig. 2.



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Fig. 3.

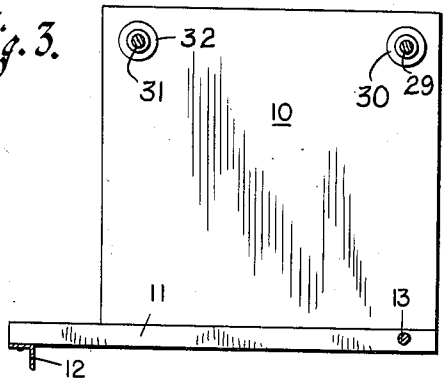
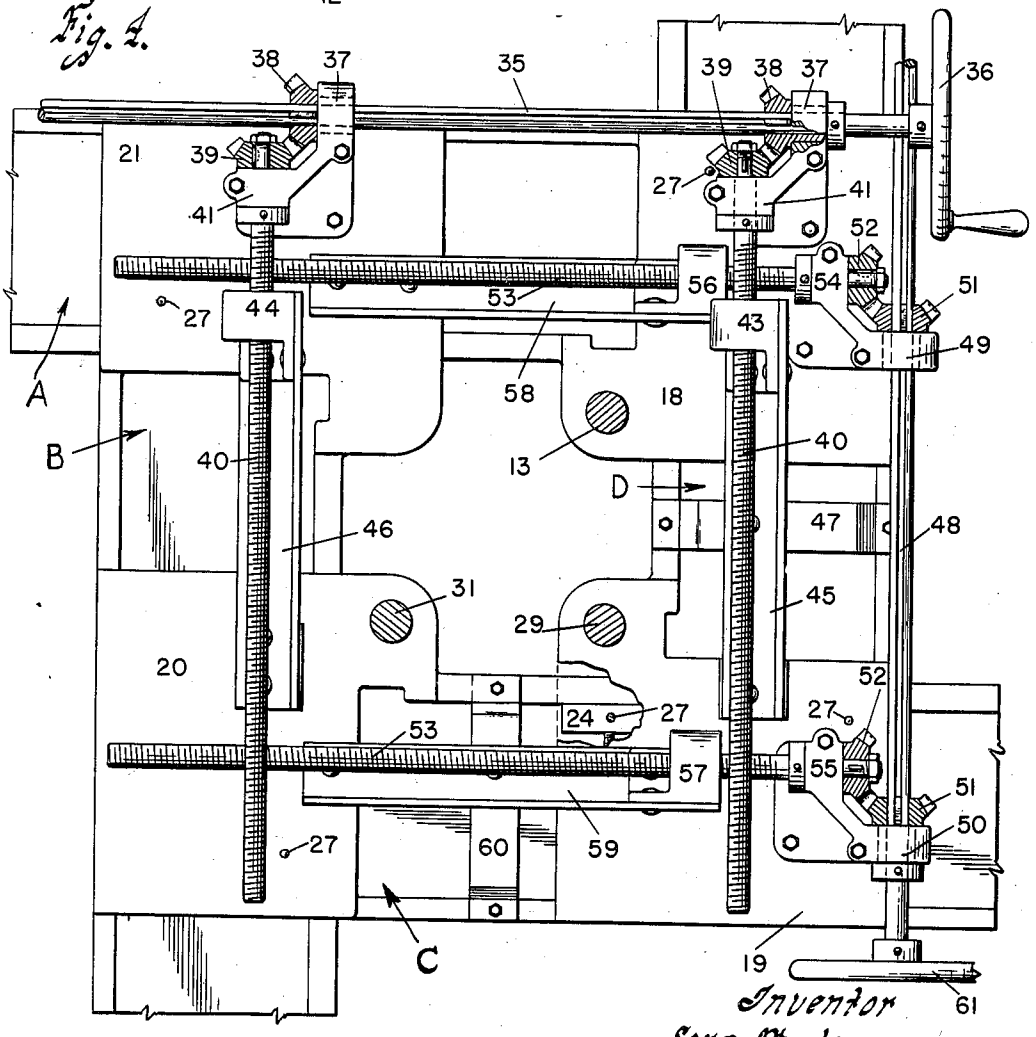


Fig. 4.



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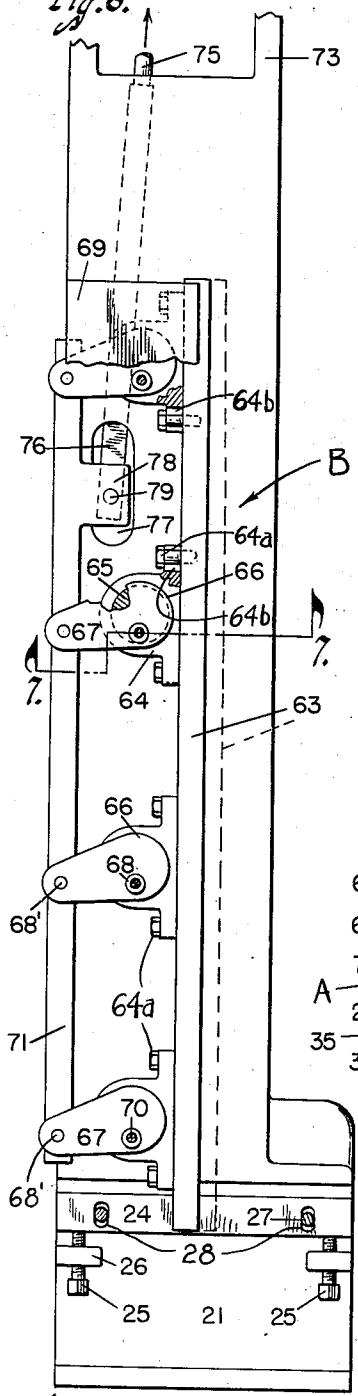
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Fig. 6.



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Fig. 7.

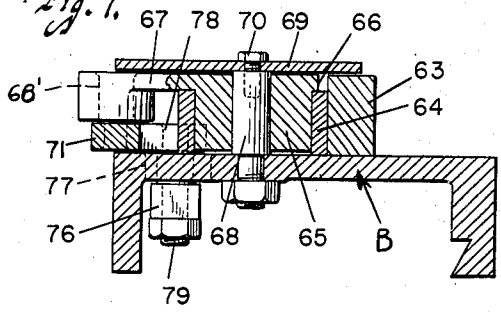
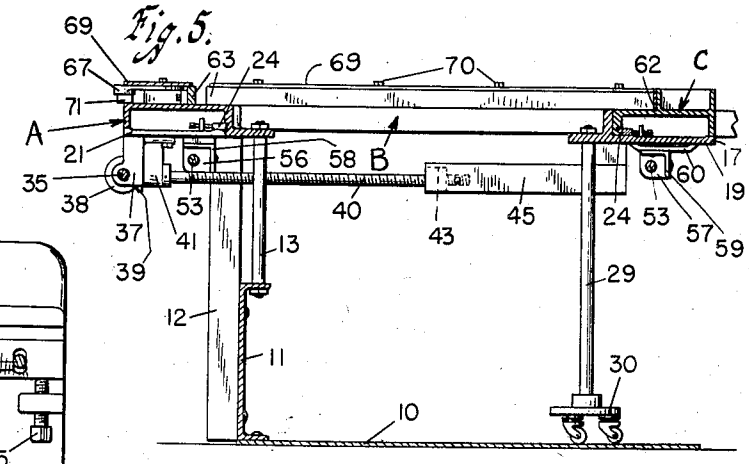


Fig. 5.



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Patented Jan. 23, 1940 2,188,053

UNITED STATES PATENT OFFICE

2,188,053

ASSEMBLING DEVICE

Sern Madsen, Clinton, Iowa, assignor, by mesne assignments, to Curtis Companies Incorporated, Clinton, Iowa, a corporation of Iowa

Application August 23, 1937, Serial No. 160,501

8 Claims. (Cl. 144—291)

My invention relates to an assembling device or apparatus used in assembling frames of wood-work units, properly squaring them and holding them in such position for fastening the parts together.

More particularly it is my object to provide a device of the kind under consideration having a substantially rectangular frame, the parts of which are adjustable for assembling and holding wood-work units of different sizes while being fabricated. This device has movable jaws on certain of the frame members and means for actuating them for finer adjustments and for exerting the necessary edgewise pressure on the wood-work units.

Another object is to provide such a device which will draw parts to be assembled into a wood-work unit tightly together, always in perfectly square relationship and which is simple, positive, uniform and accurate in operation.

Still another object is to provide a device so constructed and arranged as to make for speed of production and reduce to a minimum the fatigue of the operator while working with the device.

Another and general object is to provide such a device which is readily adjustable for use with a wide variety of sizes of wood parts and which will still allow the operator free access to the wood-work unit being assembled and at the same time the operator stands adjacent his work in the same relative position to his work, notwithstanding differences in the size of the wood-work unit being assembled.

Thus, it is my purpose to provide an adjustable apparatus which will permit the operator to stand close to the wood-work unit being assembled on any one of its four sides regardless of its size.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my wood-work unit assembling device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims and illustrated in the accompanying drawings, in which:

Figure 1 is a top or plan view of a wood-work unit assembling device embodying my invention.

Figure 2 is a side elevation of the same.

Figure 3 is a horizontal sectional view taken on the line 3—3 of Figure 2, illustrating particularly the base plate of the device.

Figure 4 is a horizontal sectional view taken on the line 4—4 of Figure 2 and looking upwardly at the parts.

Figure 5 is a vertical sectional view taken on the line 5—5 of Figure 2.

Figure 6 is an enlarged top view of the left hand main frame member as illustrated in Figure 1, parts being removed and parts being shown in section; and

Figure 7 is a horizontal sectional view taken on the line 7—7 of Figure 6.

I provide a metal plate 10 shown particularly in Figure 3 designed to rest on the floor so that certain of the casters hereinafter mentioned may travel readily on it. This plate is a base for the device.

Extending upwardly from the base plate 10 along one edge thereof and projecting at one end beyond the base plate, is an inwardly opening channel bar frame member 11, best shown in Figures 2 and 5. At the extended end of the frame member 11 there is secured thereto to provide thereabove an angle bar frame member 12. At the other end of the member 11 an upright 13 is secured to that member to project upwardly as illustrated in Figure 5, for instance.

The apparatus has four main frame members forming a rectangular frame. These frame members are indicated generally in Figure 1 at A, B, C and D. Each of the frame members A, B, C and D are substantially alike as to shape and construction, except as to attachments which will hereinafter be described. The frame member A is fixed and is supported by the members 12 and 13. The frame member A consists of a downwardly opening channel section. At one end of the member A a horizontal plate 18 projects from the end thereof, with its upper surface substantially flush with the bottom of the channel shaped section. The plate 18 is preferably formed integral with the channel portion of the frame member A.

Viewing the parts as they are shown in Figure 1, the lower or channel end of the main frame D slides on the plate 18 at the right hand end of the frame member A.

Similarly the channel ends of the frame members C, B and A slide on similar plates 19, 20 and 21, respectively, of the frame members D, C and B. The four frame members A, B, C and D thus occupy positions on the four sides of a rectangle with the channel portion of one member resting on the plate portion of the adjoining member successively around the rectangle.

The frame members C and D have nail holding compartments 22 on their top faces and the frame members B and C have movable jaw mechanisms (to be described hereinafter).

The inner flange of the frame member D has on its inner face a V-shaped groove 23. The frame member D rests on the plate 18, as shown in Figure 2, with its inner flange abutting against the end of the frame member A and is held for sliding movement on the plate 18 by means of an adjustable bar 24 which rests on the plate 18 and is adapted to fit into the groove 23. The bar 24 may be adjusted toward the groove 23 by means of set screws 25 threaded through upstanding lugs 26 on the plate 18. (Also see plate 21 in Figure 6.) The bar 24 may be locked in any adjusted position by means of screws 27 extending through elongated slots 28 in the bar 24.

The adjacent ends of the frame members C and D are supported in the following manner: A portion of the plate 19 projects inwardly and rigidly connected therewith is a leg 29 mounted on a suitable caster stand 30 which travels on the plate 10. The corner junction of the frame members C and B are likewise supported on a leg 31 and a caster stand 32.

The frame member D is connected with the right hand end of the frame member A. The left hand end of the frame member A rests immediately above the plate 21 of the frame member B and is connected therewith by a bar 24 in the manner already described so that the plate 21 and the frame member B really hang from the frame member A. This connection is made more rigid and substantial by another feature of which mention will be hereinafter made.

I shall now describe the means for adjusting the frame members A, B, C and D for adapting the machine for assembling different sizes of units, (for example, window frames). For pulling the frame members D and C toward the frame member A, I provide underneath the frame member A a shaft 35 on the end of which, at the front of the device, is a hand wheel 36. The shaft 35 is journaled in bearings 37 fixed to the plates 18 and 21 respectively. Slidably, but non-rotatably mounted on the shaft 35 adjacent the respective bearings 37, are sleeved bevel gears 38. The gears 38 mesh with coacting bevel gears 39 on threaded shafts 40 journaled in bearings 41 which are preferably formed integral with the bearings 37. The shafts 40 are threaded into bearing nuts 43 and 44 mounted on angle bar brackets 45 and 46. The bracket 45 is fixed to the plate 19 and is also supported by a strut-like member 47 secured to the downwardly turned flanges of the frame member D.

The supporting brackets 46 for the bearing nut 44 is secured to the plate 20. The frame member C may be drawn toward the frame member A, carrying with it the frame member D, by rotating the hand wheel 36. This rotates the shaft 35 and the shafts 40. The shafts 40 are fixed against sliding movement in the bearings 41 and being threaded in the bearing nuts 43 and 44 they cause the bearing nuts 43 and 44 to travel on the shafts 40. The frame member C is thus pulled toward the frame member A, sliding on the frame member B and the frame member D sliding on the frame member A until the desired adjustment has been made.

Of course, the frame member C may be moved away from the frame member A. It will, of course, be understood that in this traveling movement, the casters 30 and 32 of legs 29 and 31 travel on the plate 10.

For adjusting the frame member B toward the frame D and sliding the frame C on the frame D, I provide the following means:

The shaft 48 is mounted under the frame member D in bearings 49 and 50 supported on the plates 18 and 19 respectively. On the shaft 48 sleeved bevel gears 51 are slidably but non-rotatably mounted. These bevel gears mesh with coacting bevel gears 52 on shafts 53 which are non-slidably journaled in bearings 54 and 55 which are fixed with relation to the bearings 49 and 50. The shafts 53 are threadedly extended through bearing nuts 56 and 57 mounted on brackets 58 and 59. The bracket 58 is supported on the underside of the plate 21 and the bracket 59 is supported on the underside of the plate 20 and on a strut-like bracket 60, secured to the underside of the frame member 16.

By rotating the hand wheel 61 and the shaft 48, rotation is imparted to the shafts 53 causing the bearing nuts 57 to travel on the shafts 53 for thus adjusting the frame member B toward and away from the frame member D and sliding the frame member C on the frame member D.

It will be seen that by means of the apparatus herein described the frame members A, B, C and D may each be readily adjusted for supporting wood work units, such as window frames of various dimensions.

On the inner faces of the pockets 22 of the frame members C and D are mounted smooth true face plates 62 against which the units to be assembled and held can be rested. I provide on the frame members A and B adjustable jaws 63 for applying final and accurate clamping pressure to the units.

Bolted with limited sliding motion to the outer faces of the jaws 63, as best shown in Figure 6, are eccentric straps 64. Such limited sliding movement is provided for by bolt and slot connections 64*a* and 64*b*. In each of the eccentric straps 64 is mounted an eccentric disc 65 having at its upper part an annular shoulder 66 from which projects horizontally an arm 67. Each eccentric disc 65 is eccentrically journaled on a stud 68 mounted in the underlying frame member A or B, as the case may be. A cover plate 69 is supported on the studs 68 to cover the discs and the sliding jaw 63. The plate is held in position by means of screw bolts 70 screwed into the studs 68.

As shown in Figure 5, the left end of the clamp jaw 63 of the frame member B overhangs the member A to provide greater rigidity of connection between the members A and B.

For simultaneously rocking the eccentrics 65 on their studs 68 and thus adjusting the jaw 63 from the dotted line position to full line position and vice versa (see Figure 6), I pivotally connect each of the arms 67 by means of studs 68′ with a bar 71. Thus, by shoving the bar 71 endwise, the parts can be operated for adjusting the jaws 63 on the frame members B and A.

For actuating the slide bars 71, I provide the following means: The frame members A and B have their ends as indicated at 72 and 73 arranged to project away from the main frame of the machine and to support a pneumatic device 74 of standard construction for operation by air. This pneumatic device 74 has a stem 75 which actuates a bar 76 which is arranged to reciprocate underneath the frame member B or A, as the case may be.

In each of the frame members A and B is an elongated slot 77, one of which is illustrated in Figure 6. On the bar 71 is a lug 78 which projects over the slot 77. A bolt or the like 79 extends through the lug 78 and the elongated slot 77. The

bolt 79 affords a pivotal connection between the lug 78 and one of the bars 76 so that reciprocation of the bar 76 imparts reciprocatory movement to the bar 71 for operating the movable jaws 63.

Operation

If we assume that the frame members A, B, C and D are in expanded position and that it is desired to reduce its size for supporting a wood-work unit, for instance a window frame of a certain size, the operator first adjusts the frame members to approximately their positions for supporting the unit on the frame members A, B, C and D, adjacent the plates 62 and jaws 63. This is done by operating the hand wheels 36 and 61. For example, by operating the hand wheel 36 and thus rotating the threaded shafts or rods 40, the frame member C can be drawn toward the fixed frame member A, sliding on the frame member B, and carrying with it the frame member D, which slides on the frame member A.

When the proper adjustment between the frame members C and A has thus been accomplished, the operator may then turn the hand wheel 61 for rotating the shafts 53, which will cause the frame member C to slide toward the frame member D with a sliding movement on the frame member A, carrying with it the frame member C which slides on the frame member D.

When the adjustment desired has been thus approximately made, the parts will remain in their positions then assumed being held by the threaded rods or shafts and parts connected therewith. Then the wood-work unit constituting the work is laid in place and the operator presses the button or operates the valve or takes whatever steps are necessary to actuate the devices 74, for rocking the discs 65 for forcing the jaws 63 inwardly and snugly against the work. During the clamping action, the jaw 63 frictionally engages the work and is thereby prevented from sliding on the work, the bolt and slot connections 64*a* and 64*b* permitting relative movement between the jaw and eccentric straps 64. The operator then nails the unit at the corners or does whatever other work is to be performed on it, releases the jaws and puts in the next piece of work.

Of course, the enlarging of the main frame is accomplished by similar manipulations. The movable frame members are supported in part on the fixed frame member A and in part by the supporting legs 29 and 31, the casters 30 and 32 of which travel on the plate 10.

It will be observed that my frame assembling machine is of simple construction and involves no complicated or expensive processes or parts in its manufacture. It is easily adjustable for working with window frames or other wood work units of different sizes, the work being always square at the corners.

There is positive movement of the jaws in proper paths regardless of whether the unit to be worked on has square corners or not. This is of utmost importance for in some devices built and in use for working on frames, it is found that where the work is not true, the device, when clamping it, does not draw the frame to a position with its corners accurately square. That undesirable result cannot occur where my device is used.

My device is a complete unit and no set-up operations are necessary preparatory to making the adjustment to size. The jaws faces are uninterrupted and therefore exert inward pressure around the entire periphery of the frame being worked on. The adjustments can be made very quickly.

By placing the pile of work within proper distance of the fixed frame member A, the operator can always remain within the same reach of the work. At the same time it is noted that he has clear and close up access to the work from all sides of the device. This is true for operations such as nailing, gluing, pinning or dowelling. Consequently the device makes for reducing the fatigue of the worker or operator.

This is one of those devices where numerous changes might be made in the construction and arrangement of parts and in the materials used and in the expedients employed for connecting and adjusting the parts without any departure from the main idea involved in the device, and it is my intention to cover by my claims any modifications or changes in the device as particularly illustrated which may be reasonably included within their scope and the scope of my invention.

I claim:

1. In an assembling apparatus, a supporting frame comprising four members, one of said members being fixed and the other three members being adjustable for supporting rectangular objects of different sizes while working thereon, each of said members having a work contacting face, means for adjusting at least one of said work contacting faces comprising a plurality of eccentrics connected with the adjacent work contacting face for moving it, and means for simultaneously rocking said eccentrics for moving the work contacting face perpendicularly to its work engaging face, said means comprising arms projected from the respective eccentrics, a bar pivoted to said arms, and means for actuating said bar to swing said arms.

2. In an assembling apparatus, a supporting frame comprising four members, one of said members being fixed and the other three members being adjustable for supporting rectangular objects of different sizes while working thereon, each of said members having a work contacting face, means for adjusting at least one of said work contacting faces comprising a plurality of eccentrics, eccentric straps coacting therewith and connected with the adjacent work contacting face for moving it, means for simultaneously rocking said eccentrics for moving the work contacting face perpendicularly to its work engaging face, arms projected from the respective eccentrics, a bar pivoted to said arms, and means for actuating said bar to swing said arms and thereby said eccentrics in unison, said work engaging face being longitudinally shiftable relative to said eccentric straps to permit movement of said work engaging face relative to said eccentric straps as said eccentrics are rotated.

3. In an assembling apparatus, a substantially rectangular frame comprising a fixed member and three movable members, each of said members having a first guide means arranged longitudinally thereof and a second guide means across one end thereof, said members being successively arranged with the first guide means of one member slidably coacting with the second guide means of the next preceding member, and freely movable means connected with the second guide means of two of said movable members for supporting the three movable members

at the side of the frame opposite the fixed member.

4. In an assembling apparatus, a frame comprising a fixed member and three movable members, each having guide means extending longitudinally thereof, the members being successively slidable relative to each successive guide means, movable means on two of the movable frame members for supporting all three of the movable frame members at the side of the frame opposite the fixed member, one of the three movable members being slidable on the guide means of the fixed member and thereby slidable parallel thereto, the guide means of a second of the three movable members being slidable at right angles to said fixed member and the third member being slidable at right angles and parallel respectively relative to the other two movable members by coaction of its guide means with the second member and of the guide means of the first member with the third member.

5. In an assembling apparatus, a frame comprising a fixed frame member and three movable frame members, said frame members being successively arranged in rectangular formation and having end and longitudinal guide means, the end guide means of one member being slidable relative to the longitudinal guide means of the next, an upright support for said fixed frame member, a pair of traveling legs connected with two of said three frame members for supporting all of said three frame members to form a semi-floating support therefor, the end guide means of one of the three movable members and the longitudinal guide means of the second of the three movable members being slidable on the longitudinal and end guide means respectively of the fixed member and the remaining guide means of the first and second members being slidable relative to the longitudinal and end guide means of the third movable member.

6. In an assembling device, a base plate, frame members forming a rectangular frame with one member fixed with relation to said base plate and the second, third and fourth members movable with relation to and supported in part on the plate and having guide means permitting sliding movement relative to each other and with relation to the fixed member, said guide means being at one end and longitudinally of each member, the end guide means on one member coacting with the longitudinal guide means of the adjacent member, means for sliding the third member along the second member and for carrying with it the fourth member in a direction longitudinally of the fourth member, means for sliding the second member along the fixed member and carrying with it the third member in a direction longitudinally of the fixed member, said frame members having horizontal faces adapted to support the frame to be worked on and having vertical work edge engaging faces for engaging substantially the entire periphery of a rectangular frame supported on said horizontal faces.

7. In a wood work assembling apparatus, an adjustable rectangular frame comprising four similar relatively movable members, each of said members having a longitudinal body portion provided with guide means and a transverse end portion constituting a second guide means, said first guide means of said body portion of one member coacting with said second guide means of the next adjacent member whereby said end portion is guided for straight line sliding motion along the body portion of the adjacent member, said four members being arranged in a common plane whereby the body portions of the members form the four sides of said adjustable frame and portions carried on said members for engagement against the article of wood work being assembled in said adjustable frame.

8. In a wood work assembling apparatus, an adjustable rectangular frame comprising four similar relatively movable members, each of said members having a longitudinal body portion provided with guide means and a transverse end portion constituting a second guide means, said first guide means of said body portion of one member coacting with said second guide means of the next adjacent member whereby said end portion is guided for straight line sliding motion along the body portion of the adjacent member, said four members being arranged in a common plane whereby the body portions of the members form the four sides of said adjustable frame, and means for supporting said adjustable rectangular frame comprising a subframe therebelow, upwardly extending parts to rigidly support one of said frame members at substantially two corners of the frame and downwardly extending means at the other two corners adapted for support on and adjustably movable relative to said subframe.

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