Nov. 24, 1931. G. E. SWARTZ 1,833,695

JIG

Filed Oct. 1, 1926 5 Sheets-Sheet 1

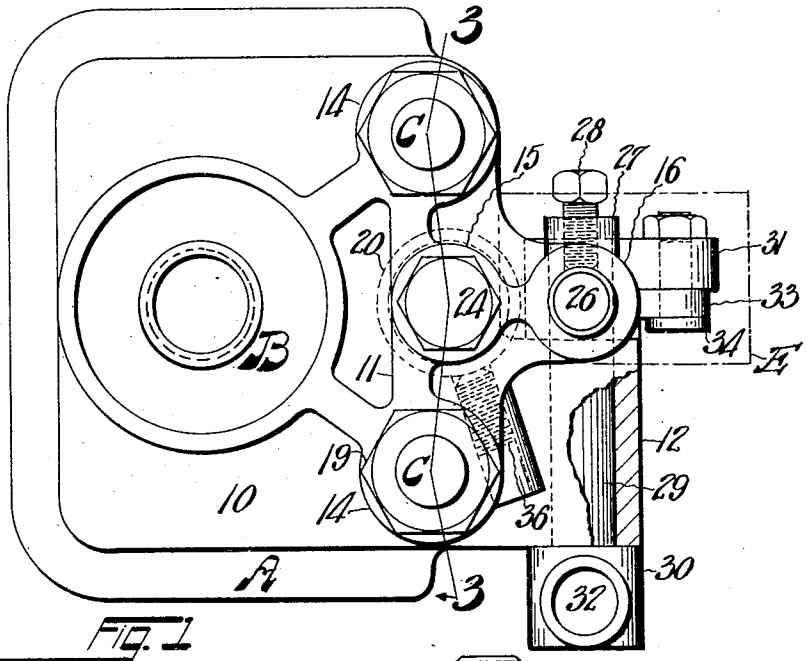


FIG. 1

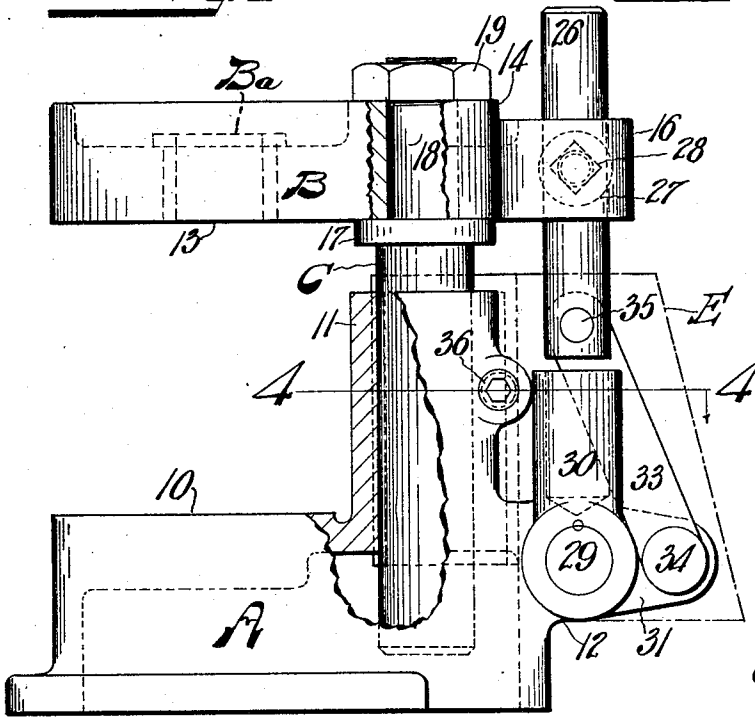


FIG. 2

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JIG

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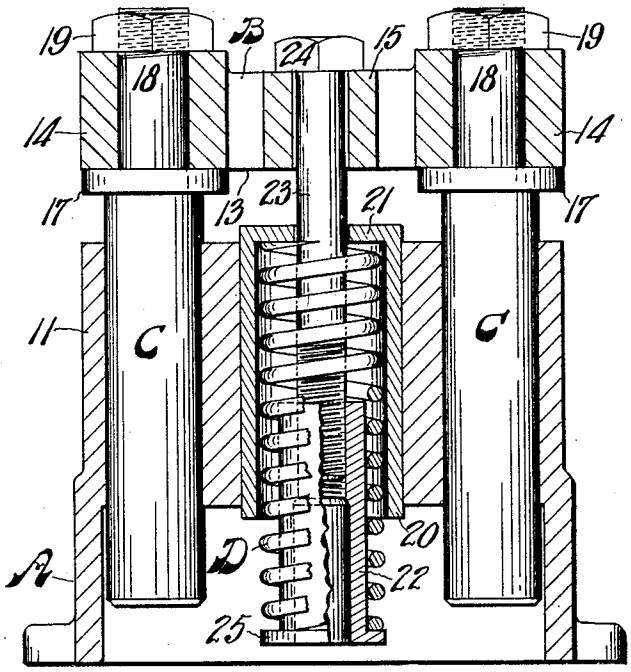


FIG. 3

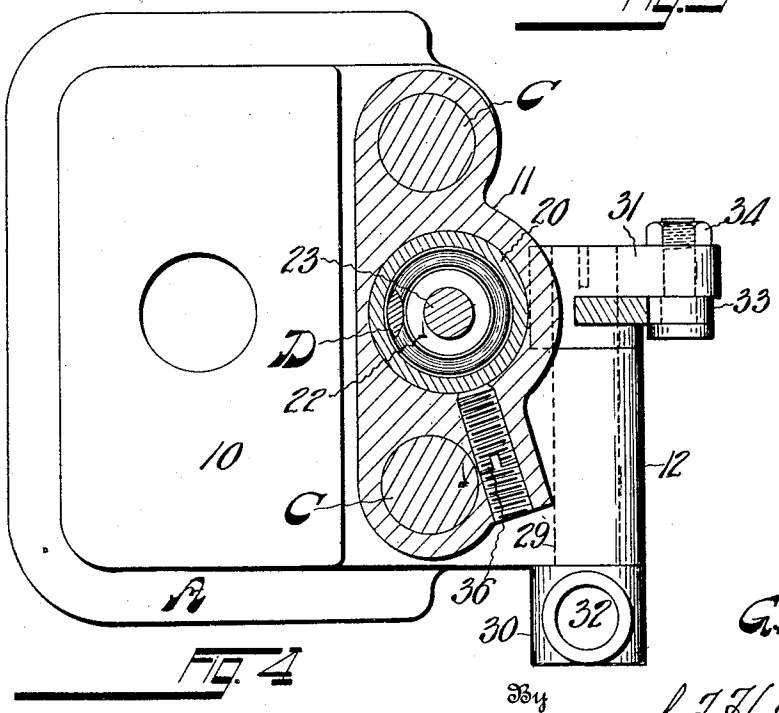


FIG. 4

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JIG

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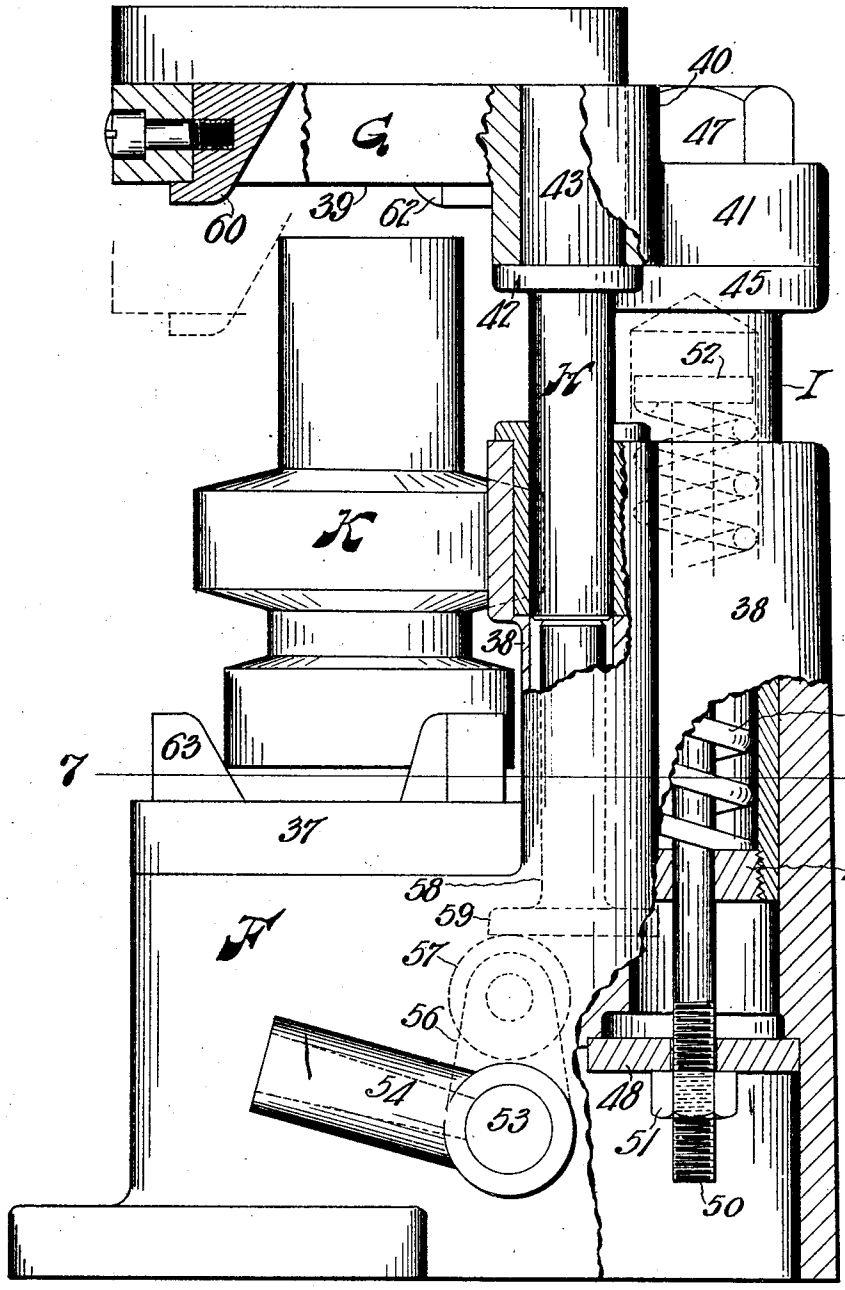


Fig. 5

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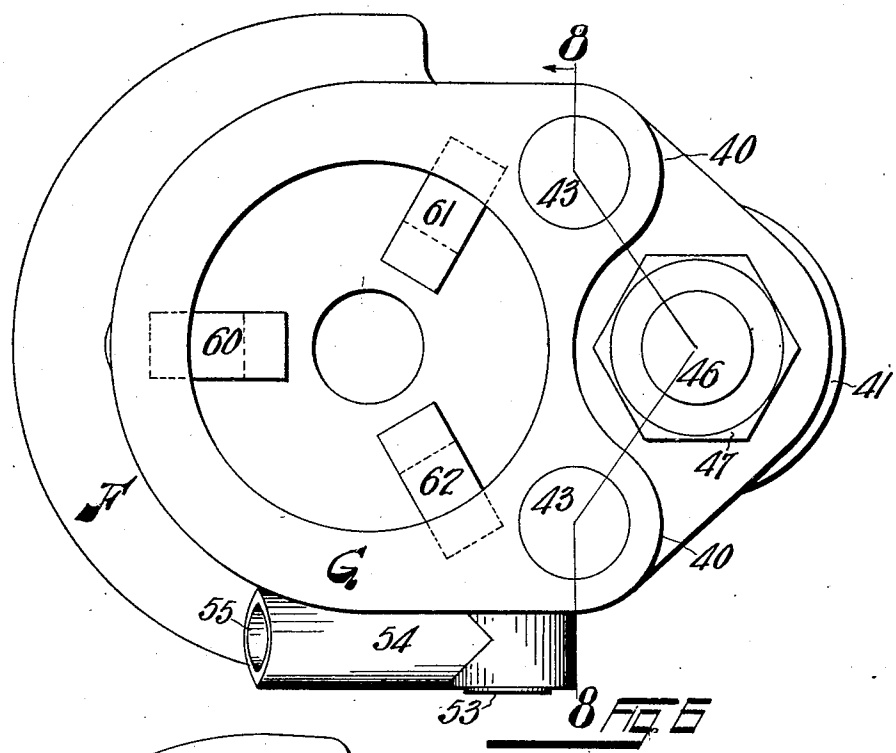


FIG. 6

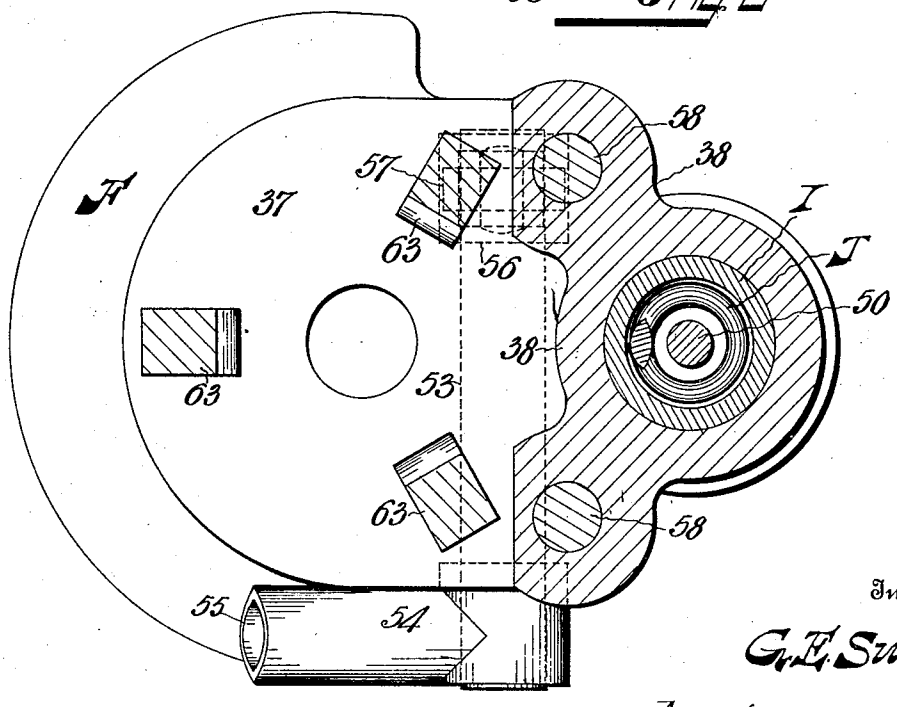


FIG. 7

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JIG

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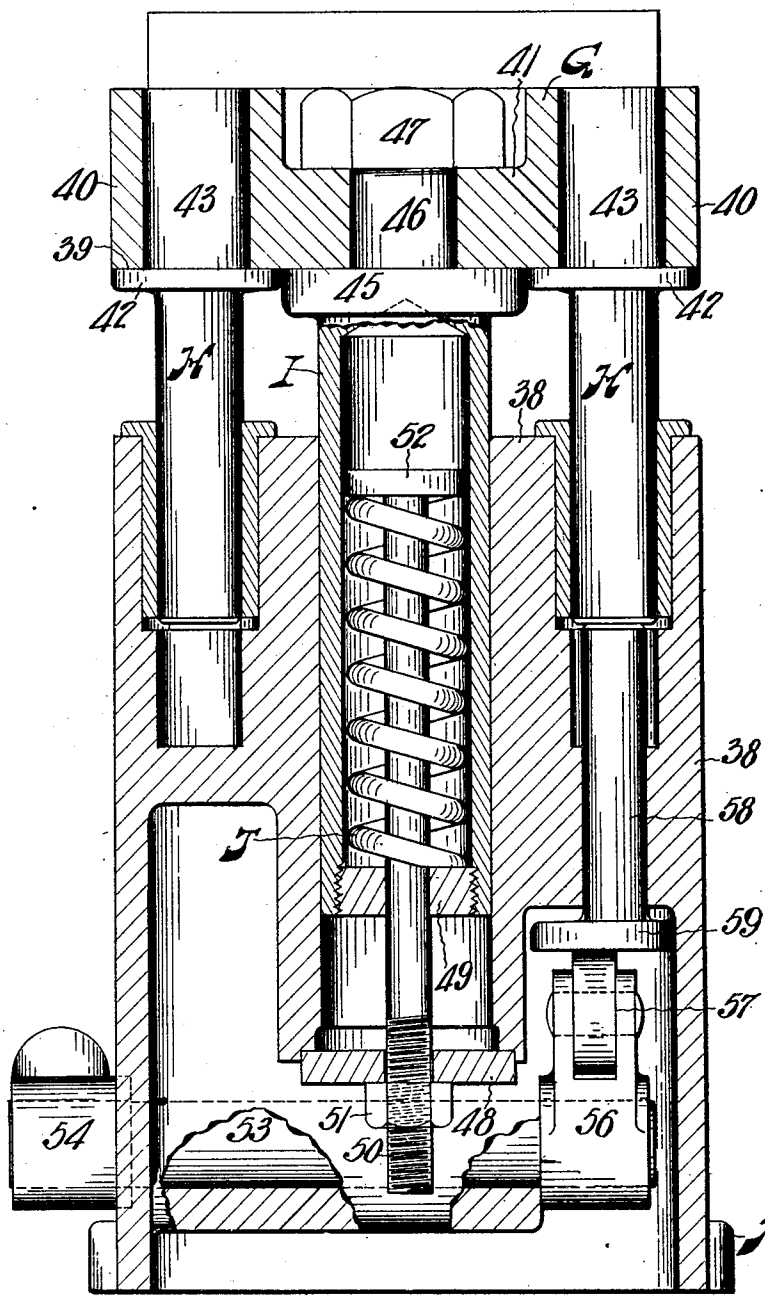


FIG. 8

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Patented Nov. 24, 1931 1,833,695

UNITED STATES PATENT OFFICE

GUY E. SWARTZ, OF DETROIT, MICHIGAN

JIG

Application filed October 1, 1926. Serial No. 138,953.

My invention relates to jig structures generally and to self clamp jig structures particularly.

The predominating object of my invention is a simple and efficient jig means in which the binding between relatively moving elements is minimized; in which work can be held accurately; in which each of a number of commercially duplicate pieces of work is clamped with the same force; in which a spring effects the clamping; in which the spring is inclosed; in which the elements are arranged so that overhang and consequent tilting is reduced to a minimum; in which the moving mechanism is inclosed; in which the adjusting means for the spring and for the moving mechanism are inclosed; and in which the work is clamped by means of a spring. Other objects will appear, or become apparent, or obvious, during the description of the devices shown in the accompanying drawings.

In jigs it is desirable that work is clamped accurately and that each of a number of like pieces of work is clamped with the same force as the other pieces so that each piece is machined as near as possible to the same degree of accuracy.

It is also desirable that the spring means in spring actuated jigs is inclosed to prevent injury to the spring and to the operator as well as preventing tampering with the spring or changing the adjustment thereof.

It is also desirable that the work clamping means is located as close as possible to the guide means to reduce the overhang to a minimum and thereby promote more accurate work.

It is also desirable that the spring acts in such a manner that binding between the relatively moving members is minimized so that the spring and the moving members can move freely and thereby give the spring an opportunity to act freely on each piece of work.

It is also desirable that the guide means for the movable or clamping member is arranged to prevent the tilting of the clamping member to promote accurate work.

The present invention aims to provide the mentioned improvements over the prior art in jigs.

In order to promote the understanding of my invention, I have embodied the same in structure shown in the accompanying drawings, but it is understood that the embodiment so shown is not the only embodiment possible with my invention. Various modifications may be made in the structure of the elements and in the combination of elements and the general features of my invention may be embodied in jig devices other than the embodiment shown in the drawings.

In the accompanying drawings:—

Fig. 1 is a plan view of a self clamp jig embodying the features of my invention; partly in section to show the operating shaft more clearly.

Fig. 2 is a side view of Fig. 1, partly in section to show the guide post more clearly.

Fig. 3 is a section taken on a vertical plane indicated by the line 3—3 of Fig. 1 and shows the relation between the base and the guide posts and the spring more clearly in a vertical plane.

Fig. 4 is a section taken on a horizontal plane indicated by the line 4—4 in Fig. 2 and shows the relation between the base and the guide posts and the spring more clearly in a horizontal plane.

Fig. 5 is a side view of a self clamp jig, embodying the features of my invention, of a design different than the one shown in Figs. 1 to 4, partly in section to show the guide posts more clearly.

Fig. 6 is a plan view of Fig. 5.

Fig. 7 is a section taken on a horizontal plane indicated by the line 7—7 in Fig. 5 and shows the relation between the base and the guide posts and the spring and the operating mechanism more celarly in a horizontal plane.

Fig. 8 is a section taken on a vertical plane indicated by the line 8—8 in Fig. 6 and shows the relation between the base and the guide posts and the spring and the operating mechanism more clearly in a vertical plane.

Similar reference characters refer to similar parts throughout the views.

Referring now particularly to Figs. 1, 2, 3, and 4:—

The base A has the work support surface 10 and the upwardly extending member 11 and the boss 12.

The movable member B, in the present instance the clamping member, has the surface 13 and the bosses 14 (two in the present instance) and the boss 15 and the boss 16.

The guide bushing B*a*, for guiding drills or other tools, is shown as being driven into the member B with the longitudinal axis thereof parallel with the longitudinal axis of the guide posts to be described below.

The guide posts C (two in the present instance) slide longitudinally in, and are guided in, the member 11 and each has the collar 17 abutting the member B and the portion 18 extending through the respective of the bosses 14 and the nut 19 threaded to the portion 18 to hold the posts C firmly to the member B so that the posts C and the member B moves in unison.

The tubular member 20 slides longitudinally in the member 11 and has the wall 21 at one end thereof; the other end being open.

The plug 22 extends into the hollow of the member 20 and is internally threaded. The screw 23 has one end thereof threaded to the internal thread in the plug 22 and extends upwardly through the wall 21 and through the boss 15 of the member B. The head 24 abuts the end of the boss 15.

One end of the spring D abuts the wall 21 and the other end extends over the plug 22 and abuts the head 25 thereon.

The stem 26 slides in the boss 16 which has the internally threaded boss 27 for the set screw 28 which holds the member B in desired position on the stem 26. The member B can be adjusted in relation to the base A by loosening the set screw 28 and moving the member B on the stem 26 to desired position and then tightening the set screw 28.

The shaft 29 is journaled in the boss 12 and has the handle socket 30 on one end thereof and the crank 31 on the other end thereof. An operating handle of any convenient form (not shown in the drawings) may be provided with an end suitable to enter the hole 32 in the socket 30.

One end of the link 33 is hinged to the crank 31 by means of the hinge bolt 34 and the other end extends into a slot in the end of the stem 26 and is hinged therein by the hinge pin 35.

The relation of the member B to the member A can be adjusted by means of the set screw 36 in addition to the adjustment afforded by adjusting the member B on the stem 26.

The tension of the spring D can be adjusted by means of the screw 23 as is plainly evident in the drawings.

A shield E, indicated by the dot and dash lines in Figs. 1 and 2, may be provided to inclose the operating mechanism within the jig.

When the crank 31 is rotated left handedly (as viewed in Fig. 4) the link 33 moves upwardly and moves the stem 26 upwardly. Since the member B is secured to the stem 26 by the set screw 28, the member B moves with the stem 26. Since the stem 26 is slidable in the boss 16 and is held therein by the set screw 28, the member B can be adjusted on the stem 26 to change the relation between the surfaces 10 and 13.

When the crank D is so rotated far enough to bring the center of the shaft 29 and the center of the hinge bolt 34 and the center of the hinge pin 35 in alignment with the longitudinal axis of the stem 26, the member B is in uppermost position which may, conveniently, be termed inoperative or unclamping position, and is automatically held in that position by the alignment mentioned.

The spring D is normally under compression between the base through the wall 21 and the head 25. Due to the threaded engagement between the screw 23 and the plug 22, the tension of the spring D can be adjusted by manipulating the screw 23 by means of the head 24 thereon. This spring adjustment is independent of the adjustment afforded by the adjustability of the member 20.

When the crank 31 is rotated so that the previously mentioned alignment is destroyed, the spring D, through the plug 22 and the screw 23, moves the member B downwardly to a clamping position to clamp the work. The member B is held in alignment and is guided in its downward movement by the guide posts C sliding in the member 11.

In the device shown in Figs. 1 to 4, the spring D is inclosed within the jig and the crank and connecting mechanism is inclosed in the jig when the shield E is provided; two spaced parallel guide posts project from the movable member into the base and are disposed in one plane; one spring moves the movable member and is disposed intermediate the posts and substantially midway thereof and to one side of the plane of the posts and opposite the work engaging portion of the movable member and spaced the same distance from each of the posts; the spring acts on the movable member at equal distances from the posts.

Referring now particularly to Figs. 5, 6, 7, and 8:—

The base F has the work support surface 37 and the upwardly extending member 38.

The movable clamp member G has the surface 39 and the bosses 40 (two in the present instance) and the boss 41.

The guide posts H (two in the present instance) slide longitudinally in the member 38 and each has the collar 42 abutting the member G and the portion 43 extending

through the respective one of the bosses 40 and the nut 44 threaded to the portion 43 to hold the posts H firmly to the member G so that the posts H and the member G move in unison.

The hollow guide post I slides longitudinally in the member 38 and has the coller 45 abutting the member G and the portion 46 extending through the boss 41 and the nut 47 threaded to the portion 46 to hold the post I firmly to the member G so that the post I, as well as the posts H, and the member G move in unison.

The washer 48 abuts the base F at the inner end of the bore for the post I and the plug 49 is threaded into the outer end of the hollow post I.

The stud 50 has the nut 51 threaded on one end thereof and has the head 52 on the other end thereof and is disposed in the hollow of the post I and extends through the head 52 and through the washer 48.

The spring J is disposed within the post I, over the stud 50 and between the head 52 and the plug 49. The tension of the spring J can be adjusted by manipulation of the nut 51 as is plainly apparent in the drawings.

The shaft 53 is journaled in the base F. The socket 54 is secured to one end of the shaft 53 and has the hole 55 for the reception of a suitable operating lever or handle not shown in the drawings.

The crank 56 is secured to the other end of the shaft 53 and has the roller 57 journaled therein.

The push rod 58 slides longitudinally in the member 38 in alignment with one of the posts H. One end of the push rod 58 has the flange 59 normally abutting the roller 57 and the other end abuts the inner end of the one post mentioned.

In Figs. 1 to 4, the crank is shown in a clamping position of the member B while in Figs. 5 to 8 the crank is shown in a position automatically locking the member G out of clamping position.

When the shaft 53 is rotated right handedly from the position shown in Fig. 5, the spring J pushes the push rod downwardly through the movable member G and one of the posts H and when the shaft 53 is rotated left handedly from a downward position of the crank (as shown in Fig. 1 for instance) the roller 57 abuts the flange 59 and pushes the push rod 58 upwardly and thereby pushes one of the posts H and the member G upwardly.

When the crank 56 is in such a position that the axes of the shaft 53 and of the roller 57 are parallel with, or in alignment with, the longitudinal axis of the push rod, the member G is automatically locked in the uppermost position or in an inoperative position.

When the crank 56 is moved from this locking position, the spring J moves the member G towards the base to effect the clamping of the work K.

The posts H are spaced apart in one plane and are parallel and the post I and the spring J are spaced midway of the posts H and to one side of the mentioned plane.

At the other side of the mentioned plane, the member G has three work engaging members 60, 61, and 62 extending from the surface 39 thereof. The member 60 is farthest from the mentioned plane and is located or disposed substantially midway of the posts H. By locating the member 60 in such a position, the members 61 and 62 are disposed sidewise and thereby permit the work engaging members, and consequently the work K, to be disposed and held as close as possible to the posts H to minimize the overhang of the movable member.

The work engaging members 63, three in the present instance, extend from the surface 37 in alignment with the work engaging members 60, 61, and 62. The work engaging members 63 may be staggered in relation to the work engaging members 60, 61 and 62.

In the device shown in Figs. 5 to 8, the spring and the crank and the connecting mechanism are inclosed within the jig, three guide posts project from the movable member into the base, one spring moves the movable member and is disposed at equal distance from two posts disposed in one plane and acts on the movable member at equal distances from these two posts; the spring is disposed at one side of the plane mentioned, and the work engaging means is disposed on the other side of the plane mentioned and arranged to hold work as close as possible to the guide posts to minimize the overhang.

In both of the jig devices shown for illustration purposes and herein described, the overhang and consequent binding between relatively moving members is minimized; the spring means acts on the movable member to hold work accurately; the spring effects the clamping of the work so that each successive piece of work is held with the same force to avoid distortion of the work; the tension of the spring as well as the relation between the movable member and the base are adjustable to attain various clamping effects as well as affording adjustability for different kinds of work; and the elements which effect the moving of the movable member are all inclosed to prevent injury to operators and the tampering with the adjustment of the elements.

Without limiting myself to the precise structure and arrangement of elements nor to the application of my invention as shown and described,

I claim:—

1. In a device of the character described, the combination of a base having three spaced openings therein, a member movable toward

and away from said base, a member depending from said movable member and extending into the middle one of said openings, a spring within said depending member and adapted to move said movable member toward said base, two members depending from said movable member and each extending into the corresponding other two of said openings, and a crank mechanism constructed and located to act on and in alignment with at least one of the second mentioned depending members to move said movable member away from said base upon an operation of the crank mechanism.

2. In a jig the combination of a base, a clamping member movable into clamping and unclamping positions, three laterally spaced guide posts extending from said clamping member and guided in said base to guide said clamping member, said guide posts being spaced triangular to permit work to be placed close to said posts, a spring within one of said posts and mounted to normally move said clamping member into clamping position, and operable means to move said clamping member into unclamping position.

3. In a jig the combination of a base, a clamping member movable into clamping and unclamping positions, three guide posts laterally spaced obtusely triangular to permit of work to be placed close to the posts and extending from said clamping member and guided in said base to guide said clamping member, a spring within the post at the obtuse apex of the triangle and mounted to normally move said clamping member into clamping position, and operable means to move said clamping member into unclamping position.

4. In combination, a work supporting base, a work clamping member in movable relation to said base for clamping work onto the same and releasing work from the same, a plurality of laterally spaced guide posts depending from said clamping member and guided in said base for guiding said clamping member in movement thereof, a post depending from said clamping member and spaced laterally of said guide posts, a spring between said post and said base tending to move said clamping member into work clamping position, a shaft journaled in said base, a crank mechanism between said shaft and one of said guide posts, and a lever means to rotate said shaft to operate said crank mechanism for moving said clamping member out of work clamping position.

5. In combination, a work supporting base, a work clamping member in movable relation to said base for clamping work onto the same and releasing work from the same, guide member depending from said clamping member and guided in said base for guiding said clamping member in movement thereof, a spring within one of said guide members tending to move said clamping member into work clamping position, a shaft journaled in said base, a crank mechanism between the end of another one of said guide members and said shaft, and a lever means to rotate said shaft to operate said crank mechanism for moving said clamping member out of work clamping position.

6. In combination, a work supporting base, a work clamping member in movable relation to said base for clamping work onto the same and releasing work from the same, a plurality of guide posts depending from said clamping member and guided in said base for guiding said clamping member in movement thereof, one of said guide posts being hollow and having a plug in the outer end thereof, a stud with a head thereon within said stud and having a threaded end projecting beyond the end of said one guide post, a spring within said one post and over said stud and between said head and said plug and tending to move said clamping member into work clamping position, a washer over said stud and abutting said base, a nut threaded onto said stud and abutting said washer to vary the tension of said spring, and a lever and connected mechanism for moving said clamping member out of work clamping position.

7. In combination, a work supporting base, a work clamping member in movable relation to said base for clamping work onto the same and releasing work from the same, a plurality of guide posts depending from said clamping member and guided in said base for guiding said clamping member in movement thereof, one of said guide posts being hollow and having a plug in the outer end thereof, a stud with a head thereon within said hollow guide post and having a threaded end projecting beyond the end of said one guide post, a spring within said one post and over said stud and between said head and said plug and tending to move said clamping member into work clamping position, a washer over said stud and abutting said base, a nut threaded onto said stud and abutting said washer to vary the tension of said spring, a shaft journaled in said base, a crank mechanism between the end of another one of said guide posts and said shaft, and a lever to rotate said shaft to operate said crank mechanism for moving said clamping member out of work clamping position.

In testimony of the foregoing I affix my signature.

GUY E. SWARTZ.