Sept. 10, 1935. F. J. McGARRY 2,014,025

DRILL JIG

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FIG. 1.

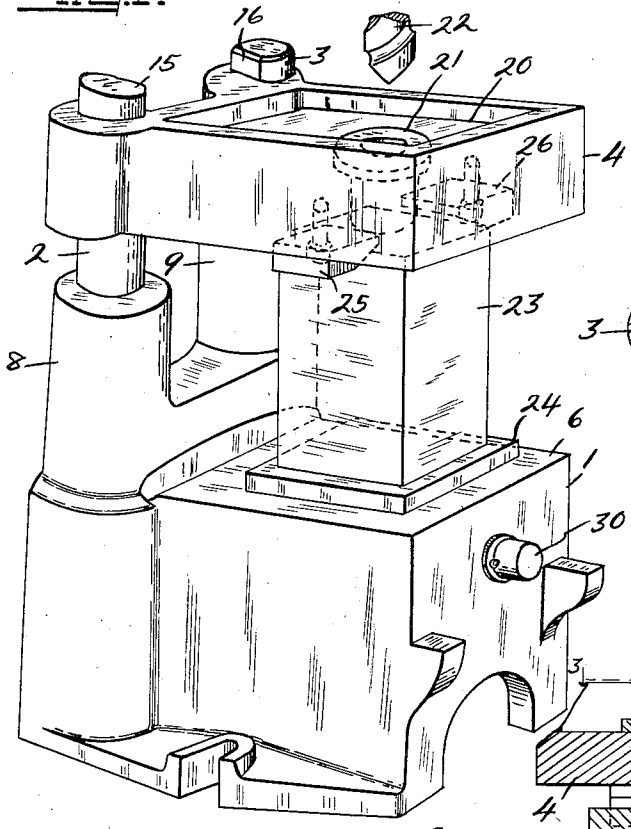


FIG. 3.

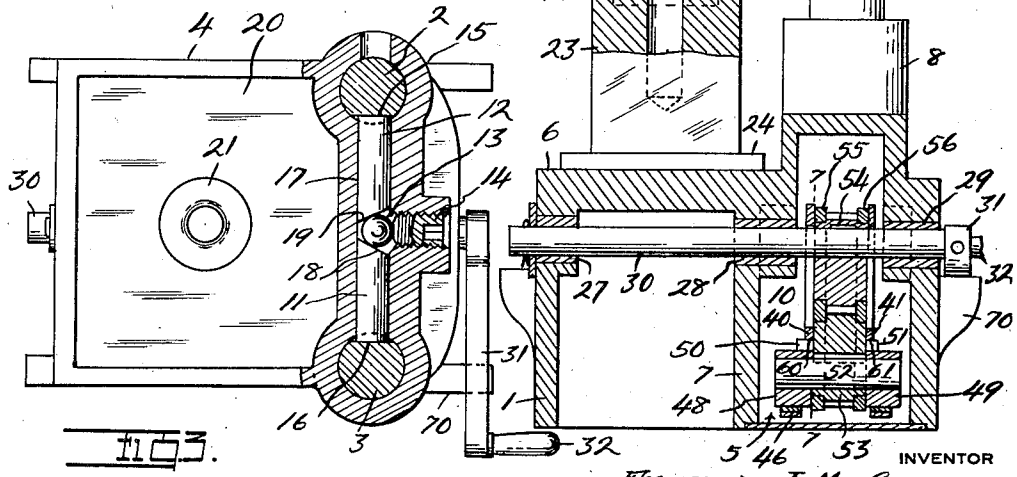
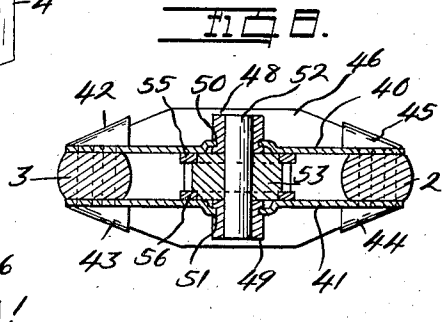


FIG. 2.



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FIG. 5.

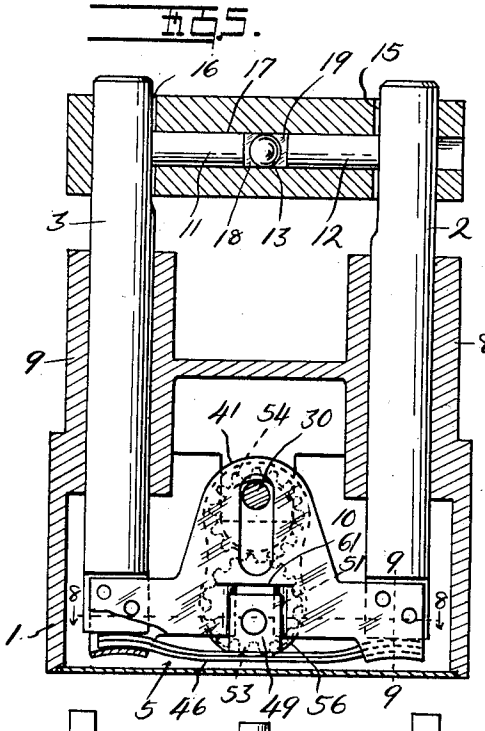


FIG. 4.

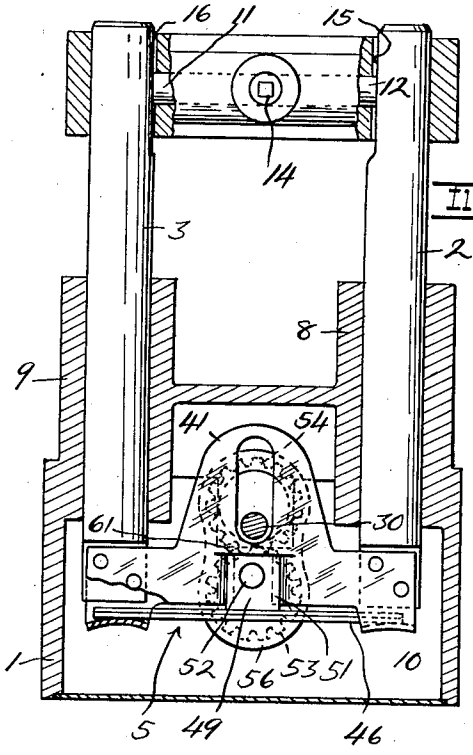
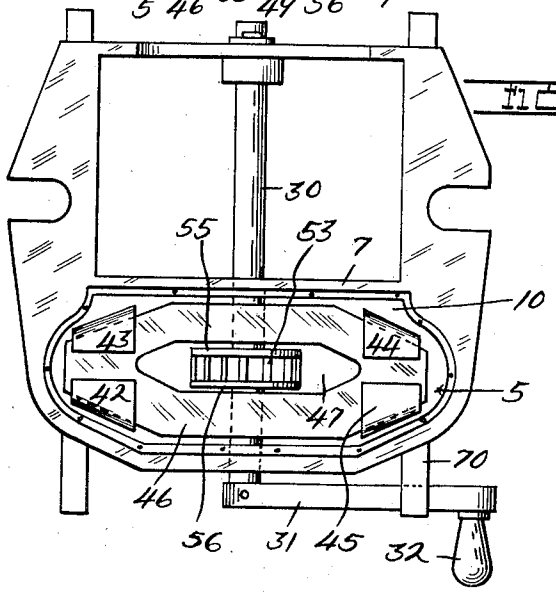


FIG. 6.



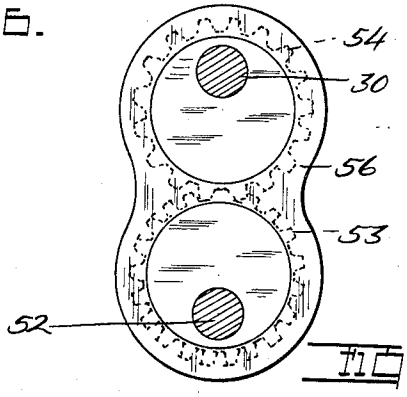


FIG. 7.

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FIG. 10.

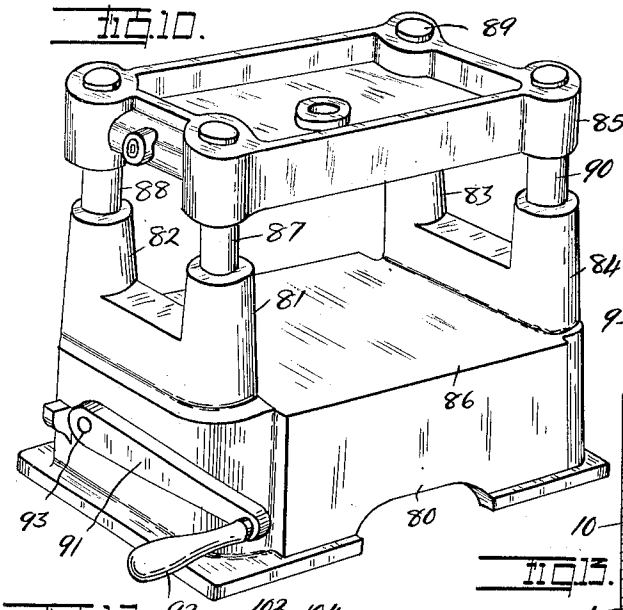


FIG. 13.

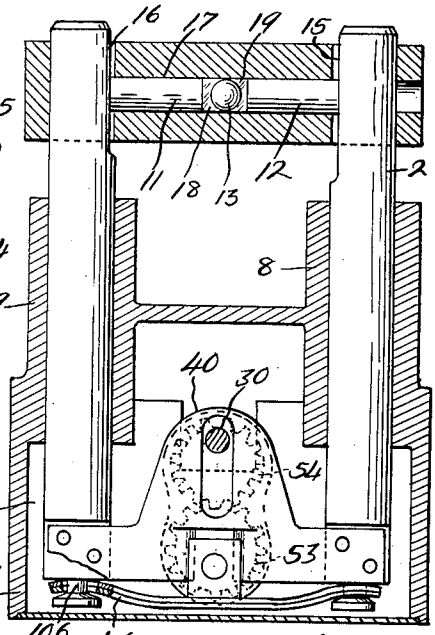
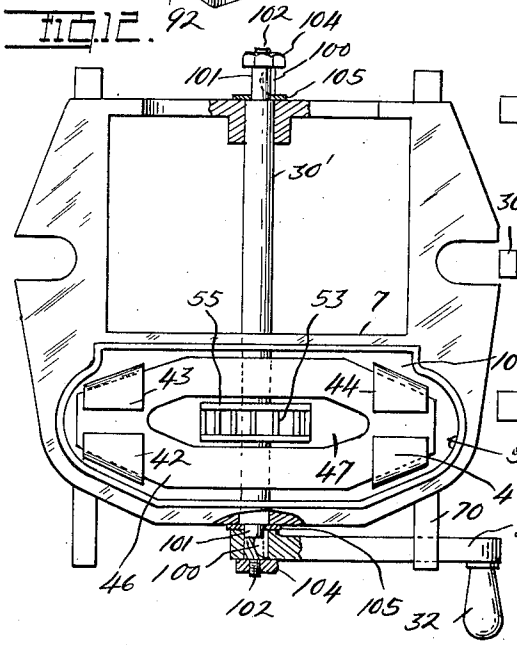


FIG. 12.



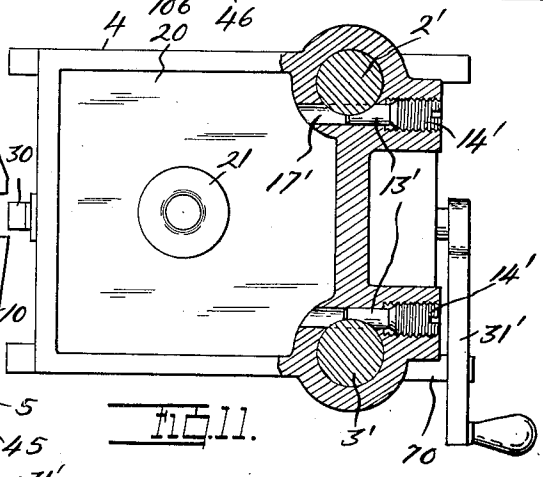


FIG. 11.

FIG. 14.

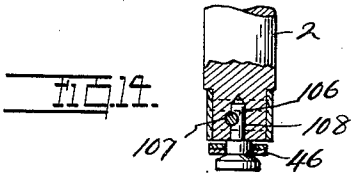
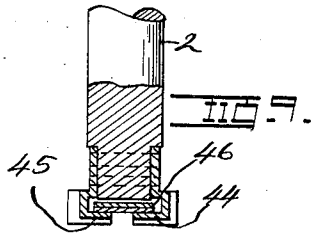


FIG. 9.



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Patented Sept. 10, 1935 2,014,025

UNITED STATES PATENT OFFICE

2,014,025

DRILL JIG

Francis J. McGarry, Toledo, Ohio

Application July 20, 1933, Serial No. 681,356

13 Claims. (Cl. 77—62)

This application is a substitute for my application Ser. No. 599,099, filed March 16, 1932, which became abandoned.

This invention relates generally to drill jigs and fixtures and consists of certain novel features of construction, combinations and arrangements of parts, that will be hereinafter more fully described and particularly pointed out in the appended claims.

In the accompanying drawings:

Figure 1 is a perspective view of a jig embodying my invention and showing work in clamped position preparatory to being engaged by a drill;

Figure 2 is a vertical sectional view through the construction illustrated in Figure 1;

Figure 3 is a sectional view taken on the line 3—3 of Figure 2;

Figure 4 is a sectional view taken at substantially right angles to Figure 2 and showing the parts in normal raised position;

Figure 5 is a view similar to Figure 4 but showing parts in lowered clamping position;

Figure 6 is a bottom plan view of the jig;

Figure 7 is a sectional view taken on the line 7—7 of Figure 2;

Figure 8 is a sectional view taken on the line 8—8 of Figure 5;

Figure 9 is a sectional view taken on the line 9—9 of Figure 5;

Figure 10 is a perspective view of a slightly modified construction;

Figure 11 is a view similar to Figure 3 but showing a slight modification;

Figure 12 is a view similar to Figure 6 but showing a slight modification;

Figures 13 and 14 are views similar to Figures 5 and 9 but showing a slight modification.

Referring now to the drawings, 1 is the base; 2 and 3 respectively are the reciprocating posts; 4 is the bushing plate; and 5 is the post actuating means of a drill jig embodying my invention. As shown, the base 1 is a hollow casting of substantially square configuration open at the bottom and having a substantially flat top 6. Preferably the base 1 has a vertical partition 7 projecting downwardly from the top portion 6 thereof and is provided at one side with a pair of laterally spaced tubular portions 8 and 9 respectively that extend upwardly from the space or chamber 10 at one side of the partition 7 to points above the top portion 6. The posts 2 and 3 reciprocate in and extend above and below these tubular portions 8 and 9. The bushing plate 4 is a casting substantially equal in area to the top portion 6 of the base and is sleeved upon the posts 2 and 3 at their upper ends. Preferably the plate 4 is adjustable longitudinally of the posts and for this purpose carries two opposed plungers 11 and 12 respectively that are normally held by a ball 13 and screw 14 in engagement with flattened portions 15 and 16 respectively of the posts. As shown, these plungers 11 and 12 are received in a transverse bore 17 in the plate 4 and have beveled inner ends 18 and 19 respectively. The ball 13 is located between these beveled ends in line with the screw 14, and the latter threadedly engages the plate 4 and is accessible from one edge thereof. Thus by adjusting the screw 14 the pressure on the ball 13 is varied so that the plate 4 may be adjusted and held upon the posts 2 and 3. Preferably the plate 4 has a recess 20 in its upper face for receiving the usual lubricating fluid and carries a flanged bushing 21 through which a tool such as the drill 22 may move for engagement with work 23 on the top portion 6 of the base. If desired a hardened metal plate such as 24 may be secured to the top portion 6 of the casting in vertical alignment with the bushing 21 to serve as a seat for the work, and blocks 25 and 26 respectively may be secured to the under side of the plate 4 at diametrically opposite points of the bushing 21 for centering the work relative to the bushing 21 and seat 24.

Journaled in bearings 27, 28 and 29 respectively in the base 1 is a shaft 30 that is adapted to be rotated by a crank 31 and handle 32, while located within the chamber 10 in the base are the elements operable by the shaft 30 to actuate the posts 2 and 3. Preferably the shaft 30 extends through opposite sides of the base so that either end may be engaged by the crank 31. However, the crank is preferably secured to the shaft in rear of the tubular portions 8 and 9 so that the crank and handle will be out of the way of work between the base 1 and plate 4. In fact, when the crank 31 and handle 32 are in rear of the tubular portions 8 and 9, as illustrated in Figures 2, 3 and 6, a much larger piece of work may be positioned between the base 1 and plate 4 to be engaged by the drill 22. The elements within the chamber 10 and operable by the shaft 30 preferably comprise a pair of substantially parallel inverted T-shaped plates 40 and 41 respectively fastened to opposite sides of the posts 2 and 3 at the lower ends thereof and having inturned flanges 42, 43, 44 and 45 respectively at its opposite ends extending inwardly in pairs below the lower ends of the posts 2 and 3, a leaf spring 46

carried by the flanges at the lower ends of the posts and provided at the center thereof with an elongated longitudinally extending opening 47, blocks 48 and 49 respectively resting on the spring 46 and slidably engaging vertical slots 50 and 51 respectively in the plates 40 and 41, a stub shaft 52 journaled in the blocks, gears 53 and 54 respectively eccentrically mounted on the shafts 52 and 30 and meshing with each other, and tie plates 55 and 56 respectively carried by the gears 53 and 54 and movable therewith between the plates 40 and 41.

In use the bushing plate 4 may be initially adjusted on the posts 2 and 3 according to the type of work to be subsequently clamped. This adjustment may be effected by merely loosening the screw 14, moving the plate 4 longitudinally of the posts and then tightening the screw 14. After such adjustment is made the jig is ready to receive the work to be clamped and the parts are normally in the position illustrated in Figure 4. After the work such as block 23 has been placed on the plate 24 the handle 32 may be swung to the position illustrated in Figure 2 whereupon the blocks 25 and 26 will be lowered into and locked in clamping position relative to the work 23. In going from the position illustrated in Figure 4 to the position illustrated in Figure 2 the two eccentric gears 53 and 54 will cause the stub shaft 52 to move the blocks 48 and 49 downwardly so that the pressure exerted thereby will be transmitted through the leaf spring 46 to the posts 2 and 3. (See Figure 5.) Thus on the down stroke no pressure is exerted by the eccentrics 53 and 54 upon the plates 40 and 41. On the return or up stroke, however, the blocks 48 and 49 are raised by the shaft 52 against the upper ends 60 and 61 respectively of the slots in the plates 40 and 41 whereupon the upward pressure is transmitted through the plates to the posts 2 and 3.

Thus it will be apparent that the jig disclosed herein is fast in operation, easy on the operator, insures positive clamping action and provides ample room for the work and clearance for the chips. The working mechanism is fully enclosed and can be easily and conveniently operated with absolute safety to the operator. The eccentric gears are small but insure relatively long strokes for the posts 2 and 3. The ratio is approximately four to one. The flat spring 46 enables the height of the jig to be lowered and automatically takes care of varying thicknesses in the work. The posts 2 and 3 are connected at the top by the plate 4 and at the bottom between plates 40 and 41, hence a very sturdy frame-like structure is provided. By adjusting the plate 4 on the posts 2 and 3 provision is made for work of various depths and for various pressures. The plates 40 and 41 not only serve as ties between the posts 2 and 3 but also serve as a guard to retain the tie plates 55 and 56 on the gears so that the latter will always be in mesh with each other. Moreover the arrangement of eccentrics is such that when the crank 31 is moved into engagement with the projection 70 after lowering the plate 4 to clamping position, the eccentrics 53 and 54 will be past dead center and a positive lock is insured. Consequently there is no loosening up of the plate once it has been lowered into clamping relation with the work. The maximum pressure is afforded in this locked position.

In Figure 10 I have illustrated a slight modification in which the casting 80 has four tubular portions 81, 82, 83 and 84 respectively and a bushing plate 85, the latter being substantially equal in area to the top portion 86 of the base 80. With this construction the top plate 85 is carried by four posts 87, 88, 89 and 90 respectively that reciprocate in the tubular portions 81, 82, 83 and 84 respectively and are operable by a single crank 91 and handle 92. Preferably mechanism such as that located in chamber 10 (Figure 2) for actuating the posts 2 and 3 is duplicated in laterally spaced chambers in the base 80 and connected to the shaft 93 and posts 87, 88, 89 and 90 respectively whereby the posts may be actuated in unison by operation of the crank 91 and handle 92. As a result the four post structure insures equal distribution of pressures through the plate 85 to the work and prevents the plate 85 from tipping or moving out of line or parallel relation with the top portion 86 of the base.

In Figure 11, I have illustrated a slight modification wherein the posts 2' and 3' are devoid of flattened portions such as 15 and 16, and plungers 13' actuated by screws 14' are used instead of the plungers 11 and 12, ball 13 and screw 14 for holding the plate 4 in adjusted position upon said posts. As shown, the plungers 13' are free to move in suitable bores 17' in the plate 4, while the screws 14' threadedly engage the plate 4 in line with said bores and are readily accessible.

In Figure 12, I have illustrated a slight modification in which Woodruff keys 100 are used instead of cotter pins for holding the shaft 30' in the base 1. As shown the shaft 30' is provided at each end with a reduced portion 101 and a threaded portion 102. The Woodruff keys 100 engage the reduced portions 101 while nuts 104 engage the threaded portions 102. Washers 105 engage the reduced portions 101 between the keys 100 and the base. Thus with this construction the crank 31' may be conveniently engaged with either end of the shaft as desired.

In Figures 13 and 14, I have illustrated a modification wherein studs 106 and pins 107 are substituted for inturned flanges 42 to 45, inclusive, for holding the springs 46. As shown, these studs 106 extend through suitable openings in the springs 46 at opposite ends thereof and engage suitable sockets 108 in the lower ends of the posts. The pins 107 extend transversely of the posts and engage suitable notches in the studs to hold the latter in place.

While it is believed that from the foregoing description the nature and advantages of the invention will be readily apparent, I desire to have it understood that I do not limit myself to what is herein shown and described and that such changes may be resorted to when desired as fall within the scope of what is claimed.

What I claim as my invention is:

1. In a jig, a base, reciprocating posts carried by said base, a bushing plate carried by and movable with said posts, and actuating means for the posts including a shaft journaled in the base, upright plates fastened to the posts at opposite sides thereof, said plates having vertical slots receiving said shaft and having other vertically extending slots therein, a leaf spring terminally connected to said posts at their lower ends, blocks in the last mentioned vertically extending slots in the plates and resting on said spring, a stub shaft journaled in the blocks, gears eccentrically mounted on the first and last mentioned shafts and meshing with each other, and tie plates car-

ried by said gears and movable therewith between the upright plates aforesaid.

2. In a jig, a base, reciprocating posts carried by the base, a bushing plate carried by and movable with said posts, and actuating means for the posts, including a shaft journaled in the base and extending through opposite sides thereof so as to be engaged at either end by an operating member, said shaft being between the vertical planes of the posts, upright plates fastened to the posts at opposite sides thereof, said plates having vertical slots receiving said shaft and having other vertically extending slots therein, a leaf spring terminally connected to said posts at their lower ends, blocks in the last mentioned vertically extending slots in the upright plates, and resting on said spring, a stub shaft journaled in said blocks, gears eccentrically mounted on the first and last mentioned shafts and meshing with each other, and tie plates carried by said gears and movable therewith between the upright plates aforesaid.

3. In a jig, a base, laterally spaced upright reciprocating posts carried by the base, a bushing plate carried by and movable with said posts, and actuating means for the posts including a shaft journaled in the base between the vertical planes of the posts, upright plates fastened to the posts at opposite sides thereof, said plates having vertical slots receiving said shaft and having other vertically extending slots therein, a leaf spring terminally connected to said posts at their lower ends and provided substantially midway between its ends with an opening, blocks in the last mentioned vertically extending slots in the upright plates and resting on the spring, a stub shaft journaled in the blocks, gears eccentrically mounted on the first and last mentioned shafts and meshing with each other, one of said gears being in the opening in the spring, and tie plates carried by said gears and movable therewith in the opening in the spring between the upright plates aforesaid.

4. In a jig, a base, reciprocating posts in the base, a bushing plate carried by the posts and movable thereby to clamp work on the base, and actuating means for said posts including a shaft journaled in the base, upright plates fixed to opposite sides of the posts at the lower ends thereof, a flat spring carried by said plates beneath the lower ends of said posts, blocks slidably engaging said plates and resting on said spring, a shaft journaled in said blocks, gears eccentrically mounted on the last and first mentioned shafts between said plates, and tie plates between said plates and gears and carried by the latter.

5. In a jig, a base, reciprocating posts in the base, a bushing plate carried by the posts and movable thereby to clamp work on the base, an operating shaft journaled in the base, and means for reciprocating the posts including upright plates fixed to opposite sides of the posts at their lower ends, a flat spring terminally carried by said posts at their lower ends, blocks resting on said spring intermediate of its ends and slidably engaging said plates, a shaft journaled in said blocks, gears eccentrically mounted on the last and first mentioned shafts between said upright plates and meshing with each other, and means constantly holding said gears in mesh carried thereby and movable between said upright plates.

6. In a jig, a base, a pair of laterally spaced reciprocating posts in the base, a bushing plate carried by the posts and movable thereby to clamp work on the base, and actuating means for said posts including a shaft journaled in the base, upright plates fastened to opposite sides of said posts at their lower ends, a flat elongated spring terminally connected to the lower ends of posts, blocks slidably engaging said upright plates and resting upon the spring intermediate of its ends, a shaft journaled in said blocks, gears eccentrically mounted on the first and last mentioned shafts, and tie plates carried by said gars and constantly holding the same in mesh.

7. In a jig, a base, a pair of laterally spaced reciprocating posts in the base, a bushing plate carried by the posts and movable thereby to clamp work on the base, and actuating means for said posts including a shaft journaled in the base, upright plates fastened to opposite sides of said posts at their lower ends, a leaf spring terminally connected to the posts, blocks slidably engaging said upright plates and resting upon said spring, a shaft journaled in the blocks, and cooperating means carried by said shafts between said upright plates for sliding said blocks against said spring including coupled meshing gears eccentrically mounted upon the shafts aforesaid.

8. In a jig, a base, reciprocating posts in the base, a bushing plate adjustably connected to the posts at the upper ends thereof and movable thereby to clamp work on the base, and actuating means for said posts including upright plates fixed to opposite sides of the posts at their lower ends, a flat elongated spring terminally connected to the lower ends of said posts, laterally spaced blocks slidably engaging said upright plates and resting upon said spring intermediate of its ends, a shaft journaled in said blocks, and cooperating means carried by said shafts for sliding said blocks against said spring including coupled gears eccentrically mounted on said shafts and meshing with each other.

9. In a jig, a base, reciprocating posts carried by said base, a bushing plate carried by and movable with said posts, and actuating means for the posts including a shaft journaled in the base, upright plates fastened to the posts at opposite sides thereof, said plates having vertically extending slots therein, a leaf spring terminally connected to said posts at their lower ends, blocks in the vertically extending slots in the plates and resting on said spring, a stub shaft journaled in the blocks, gears eccentrically mounted on the first and last mentioned shafts and meshing with each other, and tie plates carried by said gears and movable therewith between the upright plates aforesaid.

10. In a jig, a base, reciprocating posts carried by the base, a bushing plate carried by and movable with said posts, and actuating means for the posts, including a shaft journaled in the base and extending through opposite sides thereof so as to be engaged at either end by an operating member, upright plates fastened to the posts at opposite sides thereof, said plates having vertically extending slots therein, a leaf spring terminally connected to said posts at their lower ends, blocks in the vertically extending slots in the upright plates and resting on said spring, a stub shaft journaled in said blocks, gears eccentrically mounted on the first and last mentioned shafts and meshing with each other, and tie plates carried by said gears and movable therewith between the upright plates aforesaid.

11. In a jig, a base, laterally spaced upright reciprocating posts carried by the base, a bushing plate carried by and movable with said posts, and actuating means for the posts including a shaft

journaled in the base between the vertical planes of the posts, upright plates fastened to the posts at opposite sides thereof, said plates having vertically extending slots therein, a leaf spring terminally connected to said posts at their lower ends and provided substantially midway between its ends with an opening, blocks in the vertically extending slots in the upright plates and resting on the spring, a stub shaft journaled in the blocks, gears eccentrically mounted on the first and last mentioned shafts and meshing with each other, one of said gears being in the opening in the spring, and tie plates carried by said gears and movable therewith in the opening in the spring between the upright plates aforesaid.

12. In a jig, a base, a pair of laterally spaced reciprocating post-like members carried by said base, a work clamp carried by said post-like members and movable thereby to clamp work on the base, and actuating means for said post-like members including plates fastened to opposite sides of said post-like members, a flat leaf-like spring terminally suspended from said laterally spaced post-like members, blocks slidably engaging said plates and engageable with said leaf-like spring, a shaft journaled in said blocks, an operating shaft journaled in said base, gears eccentrically mounted on the first and last mentioned shafts and meshing with each other, and tie members carried by said gears and constantly holding the same in mesh.

13. In a jig, a base, a pair of laterally spaced reciprocating post-like members carried by said base, a work clamp carried by said post-like members and movable thereby to clamp work on the base, and actuating means for said post-like members including plates fastened to opposite sides of said post-like members and having slots therein, a flat leaf-like spring connected to said post-like members at one end thereof, blocks in the slots in said plates and engageable with said leaf-like spring, a shaft journaled in said blocks, an operating shaft journaled in said base, gears eccentrically mounted on the first and last mentioned shafts and meshing with each other, and a coupling for said gears constantly holding the same in mesh.

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