June 9, 1931. J. VERDERBER 1,809,576

CLAMP DEVICE

Filed March 29, 1928

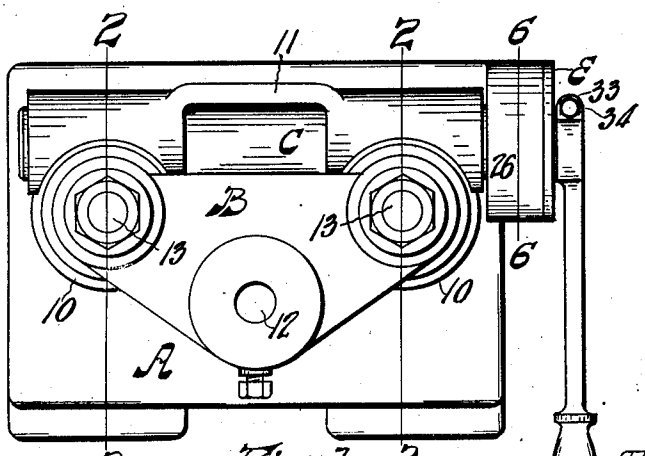


Fig. 1

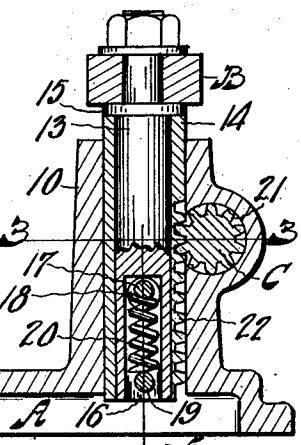


Fig. 2

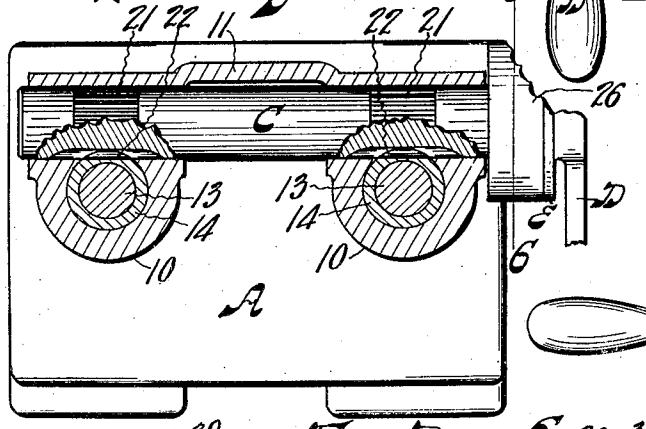


Fig. 3

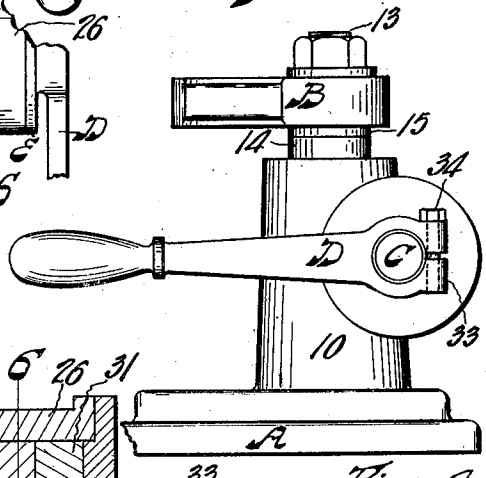


Fig. 4

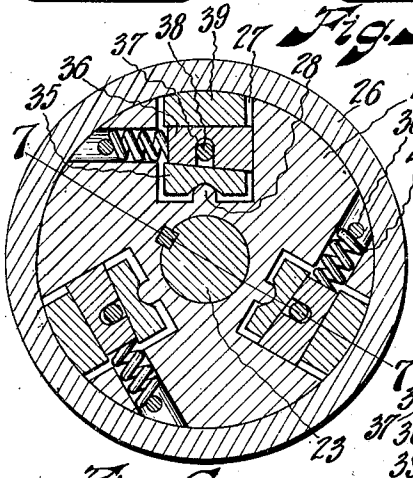


Fig. 6

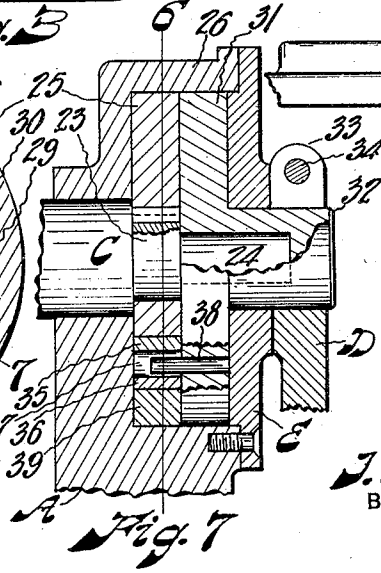


Fig. 7

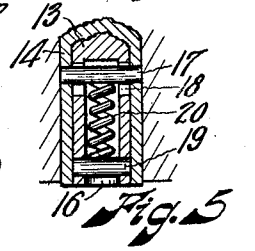


Fig. 5

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UNITED STATES PATENT OFFICE

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CLAMP DEVICE

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My invention relates to clamping devices and lock compensating means thereof.

The general object of my invention is to provide a simple, inexpensive, efficient and easily and quickly operable clamp device having means to clamp an article and lock itself and to take up slack in case the article comes loose after the clamping means is locked, all operated by one movement of the operating means. Other objects or advantages will appear, or become apparent or obvious, or will suggest themselves upon an inspection of the accompanying drawing and the description of the device shown therein.

I am aware that my invention is applicable in various manners. In order to illustrate my invention, I have selected a jig device embodying my invention and have shown the same in the accompanying drawing and described the same in detail herein.

In the accompanying drawings mentioned:—

Fig. 1 is a plan view of a jig device embodying my invention.

Fig. 2 is a transverse section taken in a vertical plane indicated by either one of the lines 2—2 in Fig. 1 and shows more clearly the relations of the clamp and compensating elements.

Fig. 3 is a transverse section taken in a horizontal plane indicated by the line 3—3 in Fig. 2 and shows more clearly the relations between the clamp bars and the clamp operating and locking mechanism.

Fig. 4 is an end view of Fig. 1.

Fig. 5 is a longitudinal section of the lower end of the clamp bars taken at right angles to the section in Fig. 2 and indicated in Fig. 2 by the line 5—5 and shows more clearly the relation between the jointed or telescoping members of the clamp element and the pins and the compensating spring.

Fig. 6 is a transverse section on a larger scale taken in a vertical plane indicated by the line 6—6 in Fig. 1 and shows the lock mechanism more clearly.

Fig. 7 is a transverse section taken in a plane indicated by the line 7—7 in Fig. 6 and shows the lock mechanism more clearly at right angles to Fig. 6.

Similar reference characters refer to similar parts throughout the views.

Referring now particularly to the jig device shown in the drawing mentioned:—

The base A has the two duplicate spaced bosses 10 each having a bore longitudinally through the same of the same diameter to permit of duplication of parts and consequent reduction in cost of production. Both bosses are connected by the tie 11 to keep the bosses as well as hereinafter described other parts in parallelism.

The clamp plate or camping element B, in the present instance also the jig plate with the one tool guide hole 12 through the same, carries two guide bars 13 spaced the same distance as the bosses 10 and extending downwardly and into and movable or slidable longitudinally in the corresponding one of the sleeves 14. Each of these movable or slidable longitudinally in the corresponding bore in the bosses 10.

Each of the bars 13 has the collar 15 and the pocket 15 extending longitudinally and some distance inward from the free end of each bar.

The pin 17 is anchored in the sleeve 14 and traverses the pocket 16 near the inner end thereof and extends through the spring apertures 18 the walls of which clear the pin with more clearance at the bottom of the pin than at the top so that the bar 13 can slide or move longitudinally in the sleeve a distance limited by the clearance above and below the pin.

The pin 19 is anchored in the bar 13 and traverses the pocket 16 near the outer end thereof, in the present instance parallel with the pin 17 although it is not necessary that these pins are parallel. The spring 20 is located in the pocket 16 and is confined by the pins 17 and 19. Normally, the spring 20 retains the collar 15 against the upper end of the sleeve 14 by pressing downwardly on the pin 19 and upwardly on the pin 17.

The shaft C, journaled in the base A, has two gear portions 21 engaging the rack-like teeth 22 in the sleeves 14 and also has the diametrically reduced portions 23 and 24.

The disc 25 is keyed to the portion 23 and rotates with the shaft C, is located in and

loosely fits in the fixed cup shaped member 26 and has three slots 27 cut through the same. The arcuately formed humps 28 extend above the normal bottom of the slots. The springs 29 are located in pockets opening into one side of the slots and one end thereof extends into the slots and the other end thereof abuts the pins 30.

The flange member 31 of the operating element is journaled on the portion 24 of the shaft C, fits loosely into the cup 26 and has the diametrically reduced portion 32 to which the operating handle D is clamped by means of the slotted ear 33 and the screw 34 through the same. This manner of attaching the handle to the member 31 permits of easy and convenient adjusting of the handle to different operators or to different operating conditions.

The plate E closes the outer end of the cup 26 and may also form a journal bearing for the portion 32. The slots 27, closed at one side by the bottom of the cup 26 and at the other side by the flange 31 are now formed into pockets.

The rockable members 35 have an arcuately formed groove in the bottom thereof adapted to ride on the arcuate surface of the humps 28; the remainder of the bottom of the members 35 as well as the sides thereof are clear of the bottom and of the sides of the slots so that the members 35 can rock on the humps on a definite axis established by the curvature of the humps.

The wedge blocks or members 36, tapering as seen in Fig. 6, have the slots 37 therein to engage the pins 38 projecting from the flange 31 sidewise but to permit the wedge blocks to move individually radially inwardly and outwardly. The wedge blocks are not as long as the width of the slots 27, thus leaving a space between the ends of the blocks and the radial walls of the slots, contact the outer surface of the members 35 and the springs 29 are located so that they abut the smaller end of the wedge blocks.

The brake shoes or members 39, of less length than the width of the slot, rest on the outer surface of the members 36 and the outer surface thereof is arcuate in conformity to the arcuate circumferential surface of the cup 26.

As to operation of the device shown and described:—

The article to be clamped is placed on the base A below the jig-clamp plate B. Upon a downward movement of the handle D, the flange 31 begins to rotate and the pins 38 thereon tend to move the wedge members in the pockets but, since the wedge members abut one end of the spring 29 and the disc 25 abuts the other end of the springs and there is no resistance against the plate A at this time, the movement of the pins rotates the disc 25 and thereby rotates the shaft C and both gears thereon in mesh with the racks on both sleeves and thereby moves both sleeves longitudinally downwardly and the guide bars and the plate A move with them through the pins 17 and 19 until the plate A contacts the article at which stage the movement of the plate A and consequently the guide bars is stopped or interrupted, or in other words, a resistance is exerted against the plate A in a direction opposite the clamping movement thereof. A further downward movement of the handle, moves the sleeves downward while the guide bars remain stationary and thereby compresses the springs 20 and moves the pins 17 within the clearance between the pins 17 and the aperture 18.

At this stage, the article is clamped into position, some energy is stored in the springs 20, and the collars 15 are away from the end of the sleeves to permit the springs 20 to move the guide bars and the plate A downwardly when necessary.

After the article is clamped as set forth the rotation of the shaft and the disc 25 is arrested or interrupted or stopped. A further downward movement of the handle rotates the flange 31 and the pins 38 thereon and thereby moves the wedge blocks but, since the disc 25 is now held against rotation, the wedge blocks move longitudinally in the pockets against the springs 29 and between the rockable and the brake members and thereby stores up some energy in the springs 29 and moves the brake members radially outwardly and forces the same against the inner wall of the cup 26 sufficiently tight to prevent rotation of the shaft C in either direction. The rockable members 35 and the brake members 39 have sufficient clearance in the pockets to automatically adjust themselves to the wedge members and the pivoting of the rockable members on a definite axis permits all of the elements of the brake mechanism to adjust themselves to each other and thereby create sufficient friction between the contacting elements to hold the same in their respective positions when the pressure on the handle is released. The final pressure exerted on the determines the amount of brake action created.

The one directional and uninterrupted movement of the handle clamps the article, automatically stores up energy for further clamping purposes if needed, and automatically locks the clamping mechanism in clamping position with the stored energy therein.

When for any reason, the article becomes loose after the clamping mechanism is locked, the stored up energy in the springs 20 at once exerts itself and automatically moves the guide bars and the plate A downwardly independently of the sleeves and thereby automatically takes up whatever looseness may be created after the clamping mechanism is locked as soon as it is created and thereby

holds the article effectively until the article is released by manipulation of the clamping mechanism.

When it is desired to release the article, the handle is moved upwardly whereby the flange 31 and the pins 38 are rotated in a direction opposite the clamping and locking direction. In this movement, the pins first engage the wedge blocks and move the same longitudinally in the pockets and thereby remove the wedge effect thereof and release the brake blocks whereupon a further upward movement of the handle rotates the disc 25 and the shaft C and moves the sleeves and the guide bars and the plate A upwardly and thereby releases the article. The springs 29, compressed to some extent during the first part of the clamping movement of the handle, aid the pins 38 to move the wedge blocks out of their wedging positions before the upward movement of the handle starts the rotation of the disc 25.

The uneven number of wedge blocks, three in the present instance, affords a better brake and lock effect than an even number of brake blocks.

The device shown and described is one of various manners in which my invention can be applied and is related to jig devices.

I am aware that my invention can be applied to or embodied in other devices and that changes and modifications can be made in the device shown and described within the scope of the appended claims; therefore without limiting myself to the precise application or embodiment of my invention as shown and described nor to the precise structure and arrangement of elements as shown and described,

I claim:—

1. A clamp device including a movable clamping element, a fixed cup member, a shaft journaled in said cup member and operatively connected with said clamping element to move the same, a disc rotatable with said shaft and having a slot therein, a brake member in said slot adjacent the inner wall of said cup, a wedge member in said slot inwardly adjacent to said brake member, and an operating member rotatable on said shaft and having means to engage said wedge member to move the same and thereby rotate said disc to move said clamping element into clamping position and thereafter wedge said brake member into locking contact with said cup when said clamping element meets resistance to clamping movement thereof.

2. A clamp device including a movable clamping element, a fixed cup member, a shaft journaled in said cup member and operatively connected with said clamping element to move the same, a disc on said shaft and rotatable with the same and having a slot therein, a movable brake member in said slot adjacent the inner wall of said cup, a wedge movable member in said slot inwardly adjacent said brake member and restricted in movement, and an operating member rotatable on said shaft and having means to engage said wedge member to move the same in one direction and thereby rotate said disc to move said clamping element into clamping position and thereafter wedge said brake member into locking contact with said cup when said clamping element meets resistance to clamping position thereof and to move said wedge member in the opposite direction and thereby release said locking contact.

3. A clamp device including a movable clamping element, a fixed cup member, a rotatable disc in said cup and operatively connected with said clamping element to move the same, a movable wedge member restricted in movement and a movable brake member radially adjacent between said cup and disc, and an operating member having means to move said wedge member to rotate said disc and thereby move said clamping element into clamping position and thereafter wedge said brake member into locking contact with said cup when said clamping element meets resistance to clamping movement thereof.

4. A clamp device including a movable clamping element, a fixed cup member, a rotatable disc in said cup and operatively connected with said clamping element to move the same, a movable wedge member restricted in movement and a movable brake member radially adjacent between said cup and said disc, and an operating member having means to move said wedge member in one direction to rotate said disc and thereby move said clamping element into clamping position and thereafter wedge said brake member into locking contact with said cup when said clamping element meets resistance to clamping movement thereof and to move said wedge member in the opposite direction and thereby release said locking contact.

5. A clamp device including base and article clamping and clamping operating means, a rotatable shaft in operative connection with said article clamping means, a positionally fixed casing, a flange in said casing and rotatable on said shaft, a disc in said casing and rotatable with said shaft, a brake shoe contactable on inner surface of said casing, and a yieldingly movable wedge means operated by rotation of said flange to rotate said disc and said shaft to clamp an article and to force said shoe against said inner surface after the article is clamped with a certain force to lock said shaft against article releasing movement.

6. A clamp device including base and article clamping and clamping operating means, a rotatable shaft in operative connection with said article clamping means, and a lock means for said clamping operating means including a positionally fixed casing concentric with said shaft, a flange means rotatable on said

shaft and having an operating handle to rotate the flange means, a disc rotatable with said shaft and having a slot therein, a brake shoe in said slot adjacent inner surface of said casing, a wedge inwardly adjacent to said brake shoe, a spring abutting said disc and extending into said slot and abutting said wedge in the wedging direction thereof, and a pin in said flange means and extending into said wedge to move the same against said spring to rotate said disc and shaft to clamp an article and to force said brake shoe against said inner surface when said article clamping means contacts the article with a force greater than the force stored in said spring to lock said shaft against article releasing movement.

7. A clamp device including base and article clamping and lockable clamping operating means, a means adapted to be put under tension by an article clamping operation to store up power for use to retain the article in position when the same would otherwise become loose after the operating means is locked, a rotatable shaft in operative connection with said article clamping means, a positionally fixed casing, a flange in said casing and rotatable on said shaft, a disc in said casing and rotatable with said shaft, a brake shoe contactable on inner surface of said casing, and a yieldingly movable wedge means operated by rotation of said flange to rotate said disc and said shaft to clamp an article and to force said shoe against said inner surface after the article is clamped with a certain force to lock said shaft against article releasing movement.

8. A clamp device including base and article clamping and lockable clamping operating means, a member of said clamping means telescoping into a member of said operating means, a spring between said members to be put under tension by movement of said operating means to store up power to move said clamping means in clamping direction to retain the article in position when the same comes loose after said operating means is locked, a rotatable shaft in operative connection with said clamping means, a positionally fixed casing concentric with said shaft, and a lock means for said clamping operating means including a flange means rotatable on said shaft and having an operating handle to rotate the flange means, a disc rotatable with said shaft and having a slot therein, a brake shoe in said slot adjacent inner surface of said casing, a wedge inwardly adjacent to said brake shoe, a spring abutting said disc and extending into said slot and abutting said wedge in the wedging direction thereof, and a pin in said flange means and extending into said wedge to move the same against said spring to rotate said disc and shaft to clamp an article and to force said brake shoe against said inner surface when said article clamping means contacts the article with a force greater than the force stored in said spring to lock said shaft against article releasing movement.

9. A clamp device including base and article clamping and clamping operating means, a rotatable shaft in operative connection with said clamping means and having a disc rotatable with the shaft, a positionally fixed cup concentric with said shaft, and a lock means for said operating means including a floating brake member adjacent inner surface of said cup, a rockable member opposite said brake member, a movable wedge member between said brake and rockable members, a spring between said disc and said wedge member, and means for moving said wedge member against said spring to rotate said disc and said shaft to move said clamping means into article clamping position and to compress said spring and force said brake member against said inner surface to lock said disc and said shaft against release movement of said clamping means.

10. A clamp device including a base, a sleeve slidable longitudinally in said base, a clamp bar in said sleeve and normally moving with the same, means between said sleeve and said clamp bar to permit said clamp bar to move longitudinally in said sleeve, a spring between said sleeve and said clamp bar and adapted to be compressed by longitudinal movement of said sleeve when pressure is exerted on said clamp bar in a direction opposite said movement thereof and to release its compression and move said clamp bar in said sleeve when said pressure thereon is released, a rotatable shaft adapted to move said sleeve and having a disc and a pocket therein, a cup shaped member concentric with said shaft and extending over said disc, a spring in said disc and extending into one side of said pocket, a floating brake member in said pocket adjacent to said cup shaped member, a rockable member opposite said brake member, a movable wedge member between said brake and rockable members and abutting said spring, and means for moving said wedge member against said spring.

In testimony of the foregoing I affix my signature.

JOS. VERDERBER.