April 3, 1956 G. C. LARSEN 2,740,310

HOLD-DOWN AND SUPPORT MAGNETICALLY ATTACHABLE TO VISE JAW

Filed April 9, 1954

Fig. 1.

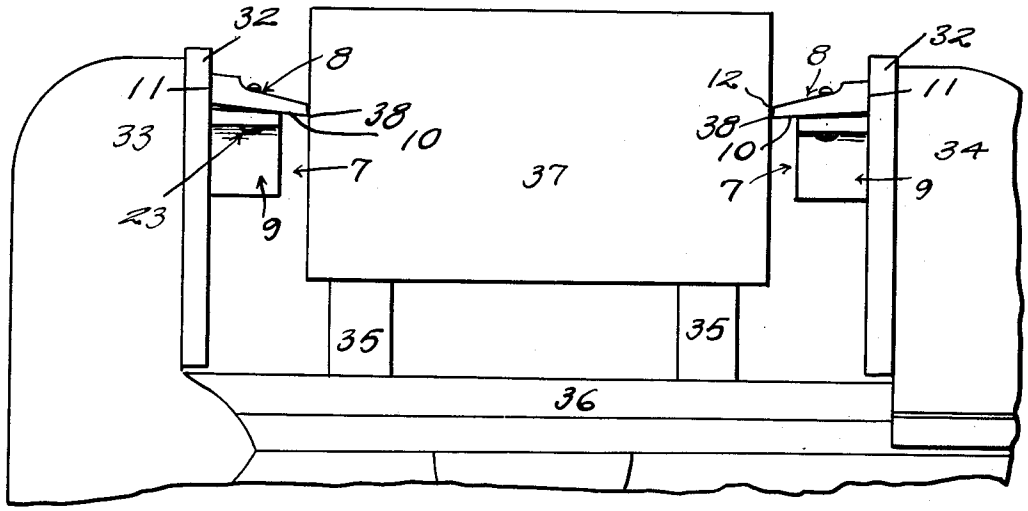



Fig. 2.

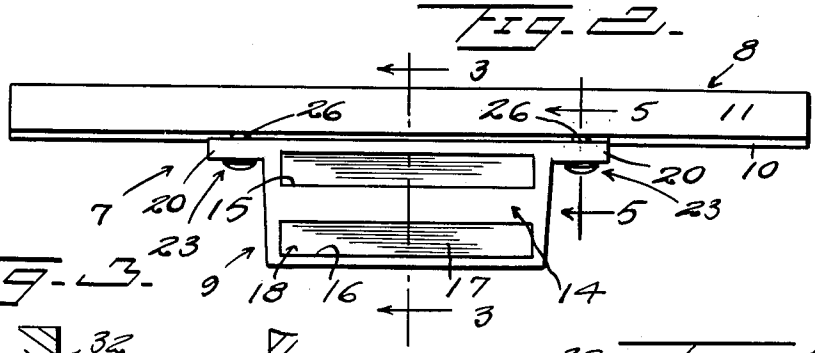



Fig. 3.

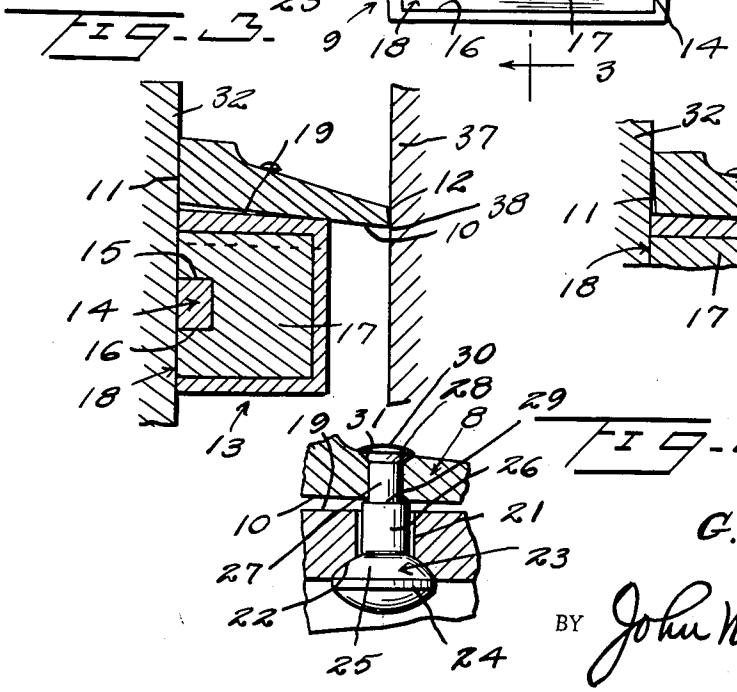



Fig. 4.

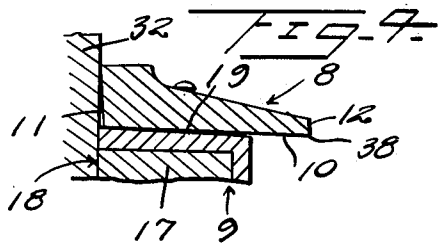



Fig. 5.

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# HOLD-DOWN AND SUPPORT MAGNETICALLY ATTACHABLE TO VISE JAW

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7 Claims. (Cl. 81—38)

This invention relates to a novel combination of hold-down and support by means of which one or a pair of hold-downs may be mounted in supported positions between the faces of a pair of vise jaws for engagement of the hold-downs with a piece of work for holding the work tight against parallels, on which the work is supported, when the vise jaws are closed.

A primary object of the present invention is to eliminate the need for manually supporting hold-downs against jaw faces and in engagement with a piece of work while the vise jaws are closed and which constitutes an extremely difficult operation which normally cannot be accomplished by one man as both hands are required to retain a pair of hold-downs properly positioned.

A further object of the invention is to provide a hold-down and hold-down support whereby a hold-down may be maintained properly positioned relatively to a jaw face for repeated use without movement or adjustment of the hold-down relatively to the jaw face, where similar workpieces are being successively clamped in a vise.

More particularly, it is an aim of the invention to provide a novel hold-down and hold-down support wherein the support is retained in engagement with a jaw face by magnetic attraction.

Another object of the invention is to provide a novel connection between the hold-down and its support, enabling a limited movement of the hold-down relatively to the support and to a jaw face as a vise is closed so that the hold-down will effect a proper "pinching down" action on the workpiece to insure that the workpiece will be held tightly against parallels on which it is supported.

Various other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawing, illustrating a presently preferred embodiment thereof, and wherein:

Figure 1 is a side elevation of a portion of a vise showing two of the hold-downs and supports disposed in operative positions therein;

Figure 2 is a rear elevation on an enlarged scale of one of the hold-downs and supports, as seen in Figure 1, as it would appear removed from the vise and with the parts in the same position as shown in Figure 1;

Figure 3 is an enlarged cross sectional view taken substantially along a plane as indicated by the line 3—3 of Figure 2 showing the unit as it appears in section in an applied position;

Figure 4 is a fragmentary cross sectional view, similar to Figure 3 showing the hold-down as it appears before being moved into engagement with a workpiece, and

Figure 5 is an enlarged fragmentary cross sectional view taken substantially along a plane as indicated by the line 5—5 of Figure 2.

Referring more specifically to the drawing, the hold-down and hold-down support in its entirety and comprising the invention is designated generally 7 and includes an elongated bar forming the hold-down, designatel generally 8, and a hold-down support, designated generally 9.

The bar constituting the hold-down 8 is preferably



formed of hardened steel and is of uniform size and shape in cross section from end-to-end thereof. The hold-down 8 has a substantially flat bottom face or surface 10 and a substantially flat rear face or surface 11 forming an angle slightly in excess of 90° with the bottom 10, which angle is preferably 92°. The upper surface of the hold-down 8 may be of various shapes but preferably tapers in thickness from the rear face 11 toward the front face 12. Said front face 12 forms an angle of less than 90° with the bottom 10, preferably at an angle of 87° or at least less than 88°, for a purpose which will hereinafter become apparent.

The support 9 includes an elongated hollow box-like casting 13, formed of a nonmagnetic alloy, having a rear wall 14 provided with top and bottom elongated openings 15 and 16, respectively, which extend substantially from end-to-end thereof. The box-like housing 13 is cast around a permanent magnet 17, portions of which fill the openings 15 and 16 and constitute a part of the rear wall 14 and the rear face 18 of the support 9. A top face or surface 19 of the support 9, formed by the top portion of the box-like housing 13, forms an angle of slightly less than 90° with the rear face 18, preferably an angle of 88½°. The housing 13 also includes ears 20, formed integral with and projecting from the ends thereof, having top surfaces disposed coplanar with and forming a part of the top surface 19. The ears 20, approximately midway between the back and front surfaces of the support 9, are provided with openings or bores 21 extending perpendicularly therethrough and which bores are provided with enlarged lower ends 22 which are preferably concave in shape, as best illustrated in Figure 5.

The unit 7 also includes a pair of corresponding rivets or fastening members, designated generally 23, each having a lower enlargement or head 24 disposed partially beneath the ear 20 with which it is associated and having an upper portion 25 conformably fitting in the flared bore portion 22. Each fastening 23 includes a shank portion 26 which extends upwardly from the head portion 25 and loosely through the bore 21 and which is of a length to extend above the top surface 19, as seen in Figure 5, when the head portion 25 is seated in the bore portion 22. The fastening member 23 includes an upper stem portion 27 of smaller cross sectional size than the stem portion 26, which extends upwardly from the stem portion 26 and snugly through an opening 28 in the hold-down 8. The upper end of the lower shank portion 26 defines a shoulder 29 around the stem 27, which shoulder abuts against the bottom face 10. The stem 27 terminates in an enlargement or upper head 30 which seats snugly in an enlarged flared upper end 31 of the bore 28, so that the two fastenings or rivets 23 are each immovably secured to the hold-down 8 but each has a limited loose-fitting engagement with the support 9, as previously described and as clearly illustrated in Figure 5.

From the foregoing it will be readily apparent that two of the supports 9, as illustrated in Figure 1, may be employed simultaneously and may be positioned with the faces 18 thereof abutting against the jaw faces 32 of a pair of vise jaws 33 and 34. The vise jaw faces 32 are formed of steel or other material possessing magnetic attraction, so that the magnets 17 will retain the supports 9 by magnetic attraction with the support faces 18 disposed flush against the jaw faces 32. The supports 9 will in turn support the hold-downs 8 which are disposed thereabove and loosely connected thereto by the fastenings 23. The hold-downs 8 will normally assume positions as illustrated in Figure 4 due to the preponderance of the weight thereof being located between the fastenings 23 and the rear face 11. As thus disposed, each rear face 11 will be inclined downwardly and away from the vertical jaw face 32 and will be in contact therewith only at the upper

edge of said rear face 11. The bottom 10 of each hold-down will contact the top surface 19 of its support 8 only adjacent the rear face 11, as seen in Figure 4. Assuming that two or more parallels 35 are resting upon the top surface of the vise bed 36 between the jaw faces 32, and that a piece of work 37, to be clamped in the vise, is supported on said parallels, one vertical wall of the work 37 will be disposed against the bottom front edge 38 of one of the hold-down 8, as for example the left-hand one as seen in Figure 1. Assuming that the other jaw 34 constitutes the movable jaw of the vise, said jaw is then moved from right to left toward the jaw 33 until the edge 38 of the right-hand hold-down 8 contacts the other side of the work 37. Thereafter, a further tightening movement of the jaw 34 from right to left will cause the hold-downs 8 to rock slightly until their rear faces 11 assume positions in flush engagement with the jaw faces 32, as illustrated in Figures 1 and 3. As a result of this movement of hold-downs 8 which is relative to the supports 9, the bottoms 10 of the hold-downs will slide and fulcrum on the top surfaces 19 of the supports and said bottom surfaces 10 will be in contact with the top surfaces 19 remote from the rear faces 11, when said rear faces are in abutting engagement with the jaw faces 32, as best seen in Figure 3. Thus, the rear portions of the hold-downs will have been displaced upwardly and the forward portions 12 will have been displaced downwardly, relatively to the supports 9. Consequently, the edges 38 will have been caused to bite into the work 37 to exert a "pinching down" action thereon tending to displace the work 37 downwardly and tight against the parallels 35, in which position the work will be securely held by said hold-downs 8, until the jaw 34 is again moved away from the jaw 33. It will also be noted that when the hold-downs 8 are in clamping engagement with the work 37, so that the rear faces 11 thereof are flush against the jaw faces 32, that the front faces 12 of the hold-downs will be inclined upwardly and outwardly from the sides of the workpiece 37 at an angle of approximately 1° so that the bottom front edges 38 may have a biting engagement in the workpiece. It will thus be obvious that the supports 9 will effectively support the hold-downs 8 on the jaw faces 32 during adjustment of the vise to clamp a workpiece 37 between the hold-downs 8 and without requiring manual support of the hold-downs, so that both hands of the operator are free to actuate the vise and, if desired, to steady the workpiece 37. It will also be apparent that the units 7 may be left in desired applied positions on the jaw faces 32 during repeated operations in clamping a number of workpieces 37, thereby saving considerable time normally required to reposition a pair of hold-downs each time that they are employed for engaging a workpiece.

Various modifications and changes are contemplated and may obviously be resorted to, without departing from the function or scope of the invention as hereinafter defined by the appended claims.

I claim as my invention:

1. A hold-down and hold-down support of the character described comprising a magnet adapted to be secured to a vise-jaw face by magnetic attraction, an elongated bar constituting the hold-down and being supported by and disposed above the magnet and having a rear face disposed adjacent the jaw face and inclined downwardly and outwardly relatively to the jaw face when the hold-down is loosely supported by the magnet, and means loosely connecting the hold-down to said magnet and permitting a limited rocking and sliding movement of the hold-down relatively to the magnet for rocking movement of the rear face of the hold-down upwardly and for sliding movement of the hold-down toward the jaw to position said rear face in substantially flush engagement against the jaw face.

2. The combination with a workpiece hold-down for a vise jaw, a support including a magnet secured by magnetic attraction to a vise-jaw face and on which said hold-down is supported, said hold-down having a rear face, and means loosely connecting the hold-down to said support for a limited rocking and sliding movement of the hold-down relatively to the support whereby the rear face of the hold-down may be rocked upwardly and displaced toward the jaw face to position said rear face substantially flush against the jaw face.

3. A hold-down and hold-down support of the character described comprising a support having a rear face adapted to be disposed flush against a vise-jaw face, said support including a magnet for securing the support by magnetic attraction to the jaw face, an elongated bar disposed on and supported by said support with a part thereof in direct contact with the jaw face, and fastening means loosely connecting said bar to the support, said bar forming a hold-down and having a limited rocking and sliding movement relatively to the support and vise jaw face for displacement of said bar part into and out of flush engagement with the jaw face.

4. A hold-down and support of the character described comprising a support having a rear face adapted to be disposed flush against a vise-jaw face, said support including a magnet securing the support by magnetic attraction to the jaw face, an elongated bar disposed on and supported by said support, fastening means loosely connecting said bar to the support, said bar forming a hold-down and having a limited rocking and sliding movement relative to the support, said support including a substantially flat top surface, said hold-down having a substantially flat bottom face engaging on and supported by the top surface of the support, the rear face and top surface of the support forming an angle slightly less than a right angle, said hold-down having a rear face disposed adjacent the vise-jaw face forming an angle with said bottom face greater than a right angle to an extent more than the difference between a right angle and the angle formed by said rear face and top surface of the support whereby said rear face of the hold-down will be normally inclined downwardly and away from the jaw face when the hold-down is resting loosely on the support, said hold-down having a front face disposed at an angle to the bottom face less than a right angle and differing from a right angle to an extent greater than the difference between the angle of the rear face and bottom face and a right angle, whereby the bottom edge of the hold-down formed by the apex of the angle of said bottom face and front face will bite into a workpiece and will be displaced downwardly as the jaw is displaced toward such a workpiece and whereby such engagement of the hold-down with a workpiece will rock the hold-down on the support to cause the rear face thereof to move into flush engagement with the jaw face.

5. A hold-down and support of the character described comprising a support having a rear face adapted to be disposed flush against a vise-jaw face, said support including a magnet securing the support by magnetic attraction to the jaw face, an elongated bar disposed on and supported by said support, fastening means loosely connecting said bar to the support, said bar forming a hold-down and having a limited rocking and sliding movement relative to the support, said support including an elongated box-like hollow housing constituting a casting, said magnet filling the hollow interior of said housing and having spaced portions forming parts of the rear face of the support, said housing having integral projections at the ends thereof constituting ears forming parts of the top surface of the support and engaged by said fastening means.

6. A hold-down and support as in claim 5, said fastening means including fastening elements having upper portions immovably secured to the hold-down and headed lower portions loosely connected nondetachably to said ears for limited rocking and sliding movement relatively to the ears in a plurality of directions.

7. In a unit of the character described, a support in-

cluding a permanent magnet and a housing in which said magnet is contained, said support having a rear face secured by magnetic attraction flush against a vise-jaw face and having a top face disposed at an angle less than a right angle to said rear face, an elongated bar forming a hold-down having a flat bottom face engaging the top face of the support, fastening means loosely connecting the hold-down to said support for a limited sliding and rocking movement of the hold-down relatively to the support, said hold-down having a rear face disposed at an angle greater than right angle to the bottom face and such that said rear face is normally inclined downwardly and away from the plane of the jaw face and the rear face of the support, said hold-down having a front face forming an angle less than a right angle with the bottom face and disposed in upwardly converging relationship to said rear face of the hold-down, the bottom edge of said front face being adapted to engage a workpiece toward which the hold-down is advanced by movement of the vise-jaw for causing the hold-down to slide and fulcrum on the top face of the support to position the rear face of the hold-down in flush engagement with the jaw face and to rock the forward face of the hold-down downwardly to cause the bottom edge thereof to bite into and exert a downward thrust on such a workpiece.



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