April 23, 1957 J. H. VAN ORDT 2,789,875

ELEVATING AND SUPPORTING DEVICE

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Fig. 1.

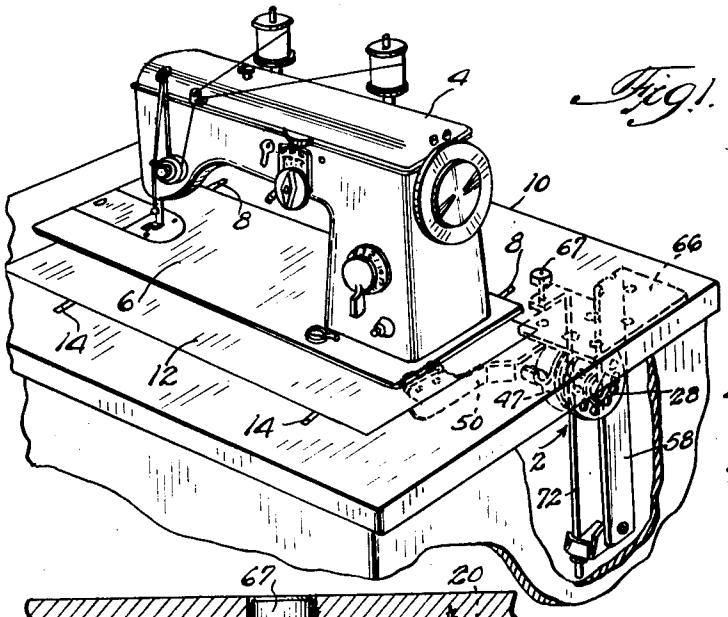
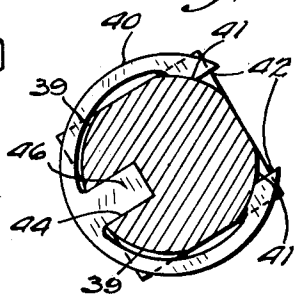


Fig. 8.



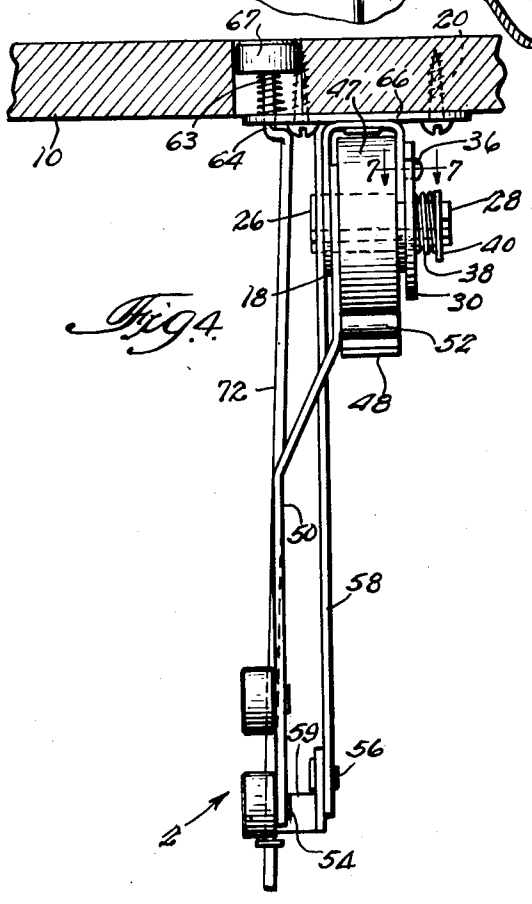


Fig. 4.

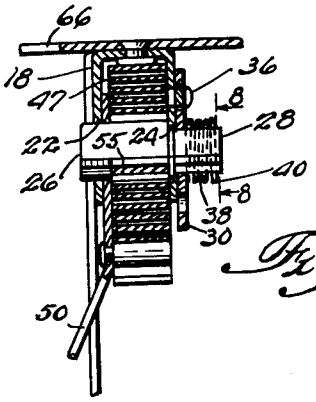


Fig. 5.

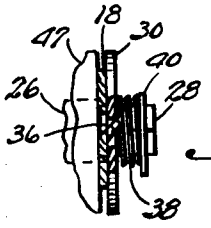


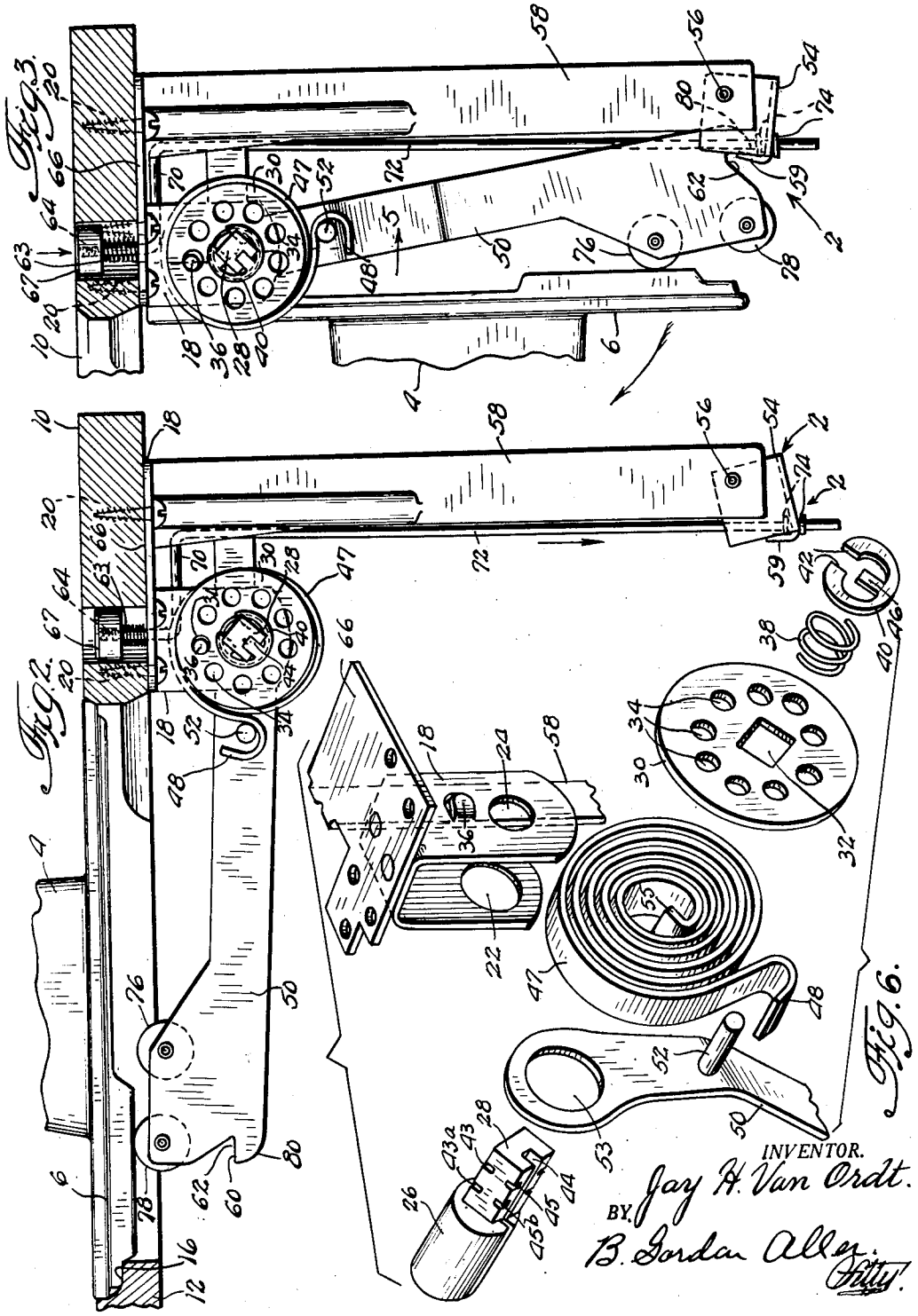
Fig. 7.

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ELEVATING AND SUPPORTING DEVICE

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2,789,875

ELEVATING AND SUPPORTING DEVICE

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Application April 5, 1955, Serial No. 499,451

3 Claims. (Cl. 312—30)

This invention relates to supports and more particularly to a novel device for elevating and yieldingly bearing the weight of a structure pivotally mounted on a support, as for example a sewing machine head pivotally mounted in a cabinet for upward movement to operative position and downward movement to retracted inoperative position within a storage space of the cabinet, so that the top of said space may be covered to conceal the machine and to provide a convenient work area thereabove.

Prior art devices of this type have generally been complicated, expensive to manufacture and/or install, and have been composed of a multiplicity of parts independently mounted in the cabinet thereby complicating assembly of the device as well as disassembly thereof for the purpose of servicing and repair. Furthermore, such prior art devices have been difficult and in many instances impossible to adjust with respect to the spring pressure which elevates and supports the hinged structure such as a sewing machine or typewriter.

Accordingly, a primary object of the present invention is to devise such a device which is economical to manufacture and is compact, capable of long life in service, and is composed of a minimum number of parts consistent with proper functioning.

A further object of the invention is to devise a novel unitary subassembly containing in a single package or unit all parts of the device preassembled in working relationship and adapted for convenient attachment to any desired support by a workman who need not be highly trained for this purpose because of the simplicity of assembly and disassembly.

Another object of the invention is to provide means for quickly and easily adjusting the spring pressure which elevates and supports the hinged structure so that any desired portion of the weight thereof may be supported by the spring when the structure is in operative position. This is particularly important with respect to sewing machines which in their operative position are preferably supported partly by the spring pressure and partly by a lockboard to provide support under sufficient gravitational force thereagainst, as for example two to three pounds or any other desired value, so as to prevent vibration of the machine when in use.

Another object of the invention is to devise an unusually compact and efficient device wherein a coiled spring is anchored at one end thereof to a support and is operatively connected at the other end of said spring to a hinged structure for elevating and supporting the latter.

A further object of the invention is to provide an arm or lever hinged to the support on an axis approximately parallel to or coaxial with that of the hinged structure, said arm having a plurality of independent antifriction bearings or rollers successively engageable with the structure at various points in its path of travel from lowermost or retracted position to operative position under pressure of the coiled spring acting on said arm.

Still another object of the invention is to devise novel

means for anchoring the inner end of the coiled spring to the support and for adjustably rotating said inner end of the spring relative to the support for adjusting the pressure developed by the spring against the arm.

Yet another object of the invention is to provide a novel parti-annular spring washer snapped into notches of a pin or shaft to which the inner end of the spring is anchored, said washer maintaining pressure on another spring which yieldingly urges to locked position a plate which locks the pin to the support in a preselected rotative position of the pin.

A further object of the invention is to devise a readily releasable latch for holding the arm in retracted position, said latch preferably being part of the unitary subassembly comprising the arm and its actuating spring, as well as the related components.

The foregoing and other objects and advantages of the invention will become apparent from a consideration of the following specification and the accompanying drawings, wherein:

Figure 1 is a perspective view of a preferred form of an elevating and supporting device embodying the invention and associated with a conventional sewing machine;

Figure 2 is a side elevational view of the device shown in Figure 1, with the elevating arm partly supporting the sewing machine in operative position within its cabinet, which is partly shown in vertical section.

Figure 3 is a view similar to Figure 2 but showing the arm latched in retracted position with the sewing machine at its lowermost inoperative position;

Figure 4 is a front elevational view of the device as shown in Figure 3;

Figure 5 is a fragmentary view similar to Figure 4 with the device partly broken away in vertical section on line 5—5 of Fig. 3, to more clearly illustrate the internal construction thereof;

Figure 6 is an exploded perspective view of the device;

Figure 7 is a sectional view on line 7—7 of Figure 4; and

Figure 8 is an enlarged sectional view on line 8—8 of Figure 5.

Describing the invention in detail, the novel unitary subassembly 2 is illustrated as applied to a conventional sewing machine 4 (Fig. 1) having a base 6 hinged as at 8 to a conventional cabinet 10. A lockboard 12 is hinged as at 14 to the cabinet 10 for upward movement to a release position whereat the sewing machine may be raised or lowered on its hinges 8. In the illustrated position of the lockboard 12, a ledge 16 (Fig. 2) thereof affords support for an edge of the sewing machine base remote from the hinged edge thereof. For the purpose of convenient description, the hinged edge of the base 6 will be designated herein as the rear edge thereof and the opposite edge of the base which is supported by lockboard 12 will be designated the forward edge of the base.

The novel unitary subassembly 2 comprises a bracket 18, preferably U-shaped and secured as by screws 20 to the cabinet 10. The bracket comprises a large bearing opening 22 and a smaller bearing opening 24 substantially coaxial therewith. A round pin 26 complementary to opening 22 is rotatably journalled therein and comprises a nonround segment 28, illustrated as square in cross-section and snugly fitted in opening 24 for rotation therein as hereinafter described.

A locking plate 30 comprises a nonround opening 32 complementary to pin segment 28 and receiving the latter so that the plate is free to move axially of the pin 26 but is locked against relative rotative movement with respect thereto about the axis of the pin 26. The plate 30 comprises a plurality of openings 34 spaced from each other

and arranged around the opening 32 for selective engagement with a lug or ear 36 of the bracket 18, and the plate 30 is biased by a spring 38 to locked position with the ear 36 received in any desired opening 34 to anchor the plate 30 to the bracket 18 against rotative movement relative thereto in any preselected rotative position of the plate 30 and pin 26.

The spring 38 is retained under compression by a parti-annular novel spring washer 40 having its free ends terminating in lugs 42 (Fig. 6) snapped into a pair of notches or grooves 43 in one side of pin portion 28 which also has an elongated groove or slot 44 receiving a complementary tongue or lug 46 of the washer 40 to hold the latter against rotational movement relative to the pin 26 for convenient removal therefrom.

The notches 43 are aligned with a pair of notches 45 in the opposite side of pin portion 28, whereby the washer 40 may be assembled therewith by inserting lugs 42 into said notches 45 and then forcing said lugs along arcuate cam surfaces 39 of the pin portion 28 into the notches 43 wherein the lugs are held by the spring action of the washer 40. By means of this novel arrangement, the washer 40 is positively interlocked with the pin portion 28 to hold the spring under compression against the plate 30. If desired, the pin portion 28 may be provided with another pair of notches 45*b* and an aligned pair of notches 43*a* for convenient assembly of plate 30 at a position whereat greater compression of the spring is achieved. The washer 40 may be removed by forcing its lugs 42 along arcuate cam surfaces 41 of pin portion 28 and into the notches 45 whereupon pressure of the washer against the pin is released. A helical spring 47 is provided with a loop or hook 48 or other suitable means to engage an arm or lever 50 having a pin or lug 52 received within the loop 48 for that purpose. The arm 50 is preferably afforded a rotatable pivot or fulcrum by the pin 26 which is received within an opening 53 of the arm 50 to afford a hinged connection between the arm and the bracket 18 on a hinge axis approximately parallel or if desired coaxial with that of the base 6. The opposite end of the spring 47 is provided with a hook or tongue 55 received within the groove 44 to anchor that end of the spring to the pin 26 against relative rotation about the axis thereof.

When the base 6 is at its lowermost position on its hinge axis as shown in Figure 3, the arm 50 is latched to render the spring 47 ineffective to urge the arm from the position illustrated in that figure. This is accomplished by a latch plate 54 pivoted at 56 to a depending leg 58 of the bracket against the lower end of said arm 50. The latch plate 54 comprises a flange 59 which engages a lug 60 of the arm 50 within a recess or notch 62 in the lower end thereof. When the flange 58 is thus engaged with the lug 60 as shown in Figure 3, the arm 50 is positively latched in its retracted or lowermost position on its hinge axis, so that the spring 47 is rendered ineffective to bias the base 6 upwardly to the position of Figure 2.

The latch plate 54 is yieldingly held in the position of Figure 3 by a spring 63 sleeved over a release rod 64, one end of the spring 63 being seated against a top wall 66 of the bracket, and the other end of said spring being seated against a release button 67 attached to the release rod 64 at its upper end. The rod 64 extends through a complementary opening of the bracket wall 66 and is bent rearwardly below said wall to define a substantially horizontal leg or portion 70 of said rod which is also bent to define a substantially vertical leg or portion 72 connected at its lower end as by washers 74 to the latch plate 54 which is provided with an opening receiving the rod at its lower end.

When the button 67 is manually depressed to release position shown in Figure 2, the base 6 is urged upwardly as the latch flange 58 is released from the lug 60 to render the spring 47 effective for the purpose of elevating the base 6. In this connection it is noted that the spring 47 is preferably adjusted as hereinafter described, to lift the weight of the base and the supported machine 4 to a position approximately ten degrees below the horizontal, whereupon the base is manually lifted with the aid of the spring 47 to a point at which the lockboard 12 can be hinged to the position shown in the drawings; the base 6 is then lowered to seat on the ledge 16 (Fig. 2) under sufficient weight to minimize vibration during use of the machine.

It may be noted that the arm 50 is preferably provided with two antifriction bearing or rollers 76 and 78, the roller 76 engaging the base 6 when the latter is in its lowermost position shown in Figure 3, and the roller 78 engaging the base 6 when the latter is in its operative position of Fig. 2. This novel arrangement permits convenient mounting of the bracket 18 with the hinge or fulcrum axis of arm 50 either coaxial with or parallel to the hinge axis of the base 6, as may be desired. Obviously if only one roller 76 or 78 were provided the hinge axis of the arm 50 would be limited to a position substantially coaxial with the hinge axis of the base 6. ... many applications of such a device, this limitation would be inconvenient.

The pressure developed by arm 50 against the underside of the base 6 may be conveniently adjusted, preferably with the arm 50 approximately in the position of Figure 3. This adjustment is made by pulling the plate 30 axially of the pin 26 against the resistance of spring 38 until the ear 36 is released from the related plate opening 34, whereupon the plate 30 may be rotated in a clockwise direction as seen in Figure 2 to increase pressure of the arm 50 against base 6, or the plate 30 may be rotated in a counterclockwise direction to decrease said pressure. The ear 36 is then positioned in another opening 34 by permitting the spring 38 to snap the plate to locked position.

Preferably, as above noted, the spring 47 is adjusted so that the arm 50, with the latch plate 54 released, is effective to hold the base 6 slightly below the level shown in Figure 2, so that the base 6 develops a pressure of about two or three pounds against the ledge 16 when the base rests thereagainst as shown in Figure 2. This novel arrangement prevents vibration of the base 6 during use of the sewing machine 4 or any other device carried by the base, and also accommodates support by spring 47 of the principal part of the weight of the base 6 and machine 4.

In returning the machine 4 and base 6 to the position of Figure 3, the user raises the base 6 to a position whereat the lockboard 12 may be rotated on its hinges 14 to permit the base 6 to pass the ledge 16 as the base moves downwardly on its hinges 8. The base 6 and machine 4 are then manually urged downwardly until the lug 60 of arm 50 engages the latch plate flange 59, whereupon a cam surface 80 of the lug 60 depresses the latchplate 54 against the resistance of spring 63 which then snaps the latch plate into latched position within the recess 62 to hold the arm 50 in its lowermost position of Figure 3.

The parts of the novel unitary subassembly 2 may be assembled by inserting the pin 26 through the bracket openings 22 and 24, through the lever opening 53 and through the spring 47 with the hook 55 thereof in the pin slot 44. Further movement of the pin 26 to the right as seen in Figure 5 is limited by the small bracket opening 24. The pin portion 28 is then inserted in opening 32 of plate 30 and is passed through the spring 38 whereupon, the washer 40 is assembled as above described to compress spring 38 against the plate 30. The plate 30 is then rotated to a position whereat ear 36 is aligned with a selected opening 34, and the plate is then released to permit the spring 38 to snap the plate to its locked position against the bracket with the ear 36 in said opening 34. The arm 50 is then rotated against the resistance of spring 47 to latched position with flange 59 of latch

plate 54 received in recess 62 of the arm. The unit is then ready for assembly with any desired support and hinged structure. Disassembly of the unit for the purpose of repairs or replacement of a worn or damaged part may be accomplished by removing the washer 40 from pin portion 28 and disassembling the parts.

It may be noted that a primary purpose of the invention is to provide a device such as above described in the form of a unitary subassembly which can be installed and removed as a package; however various other features of the invention as heretofore described and as set forth in the claims may be utilized without despect to the advantages of such a unitary subassembly.

While the present invention has been explained and described with reference to specific embodiments of structure, it will be understood, nevertheless, that numerous modifications and variations are susceptible of being incorporated without departure from the essential spirit or scope thereof.

Accordingly, it is not intended for an understanding of this invention to be limited by the foregoing description nor by the illustrations in the annexed drawings, except as indicated in the hereinafter appended claims.

What is claimed as new and desired to be secured by Letters Patent of the United States is as follows:

1. In a device for elevating and supporting a structure hinged to a support; the combination of a pin journalled to said support, a spring sleeved over said pin and connected to said structure for elevating the latter, means on said pin for rotating the latter to adjust the pressure of said spring against said structure, said means being movable axially of the pin into and out of engagement with means on said structure for locking the pin against rotation, and retaining means for holding said first-mentioned means in engagement with said locking means, said retaining means comprising grooves in the pin at one side thereof, and a parti-annular spring washer having its free ends snapped into said grooves, said pin having another pair of grooves at the opposite side thereof

aligned with the first-mentioned grooves to receive said free ends of said washer during assembly and disassembly thereof with respect to said pin.

2. A device according to claim 1 wherein the washer is provided with a lug received within an axial slot in the pin to prevent relative rotation between the pin and washer.

3. In a device for elevating and bearing the weight of a structure hinged to a support; the combination of a pin having a substantially round portion journalled to the support, said pin having a non-round portion, a plate having a non-round opening complementary to and receiving said portion for slideable movement thereby axially of the pin, means on said support selectively engageable with means on said plate to lock the latter against rotation from a preselected rotative position thereof, spring means carried by said pin portion and compressed against the plate for urging its means against those of said support, a coiled spring sleeved over said round portion and keyed thereto, a lever having an arm journalled on said round portion and connected to the spring for actuation thereby, said lever being operatively connected to said structure for elevating the latter.

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