June 18, 1968 J. A. MILLER 3,388,609

SINGLE LEVER CONTROL MECHANISM

Filed March 22, 1967

FIG. 1

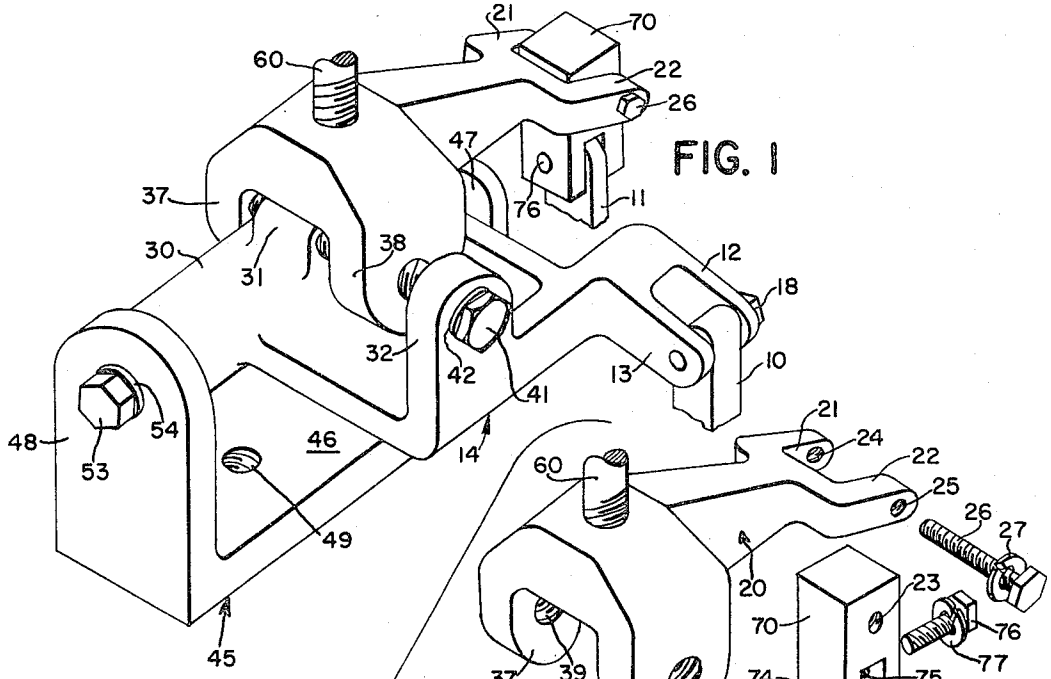
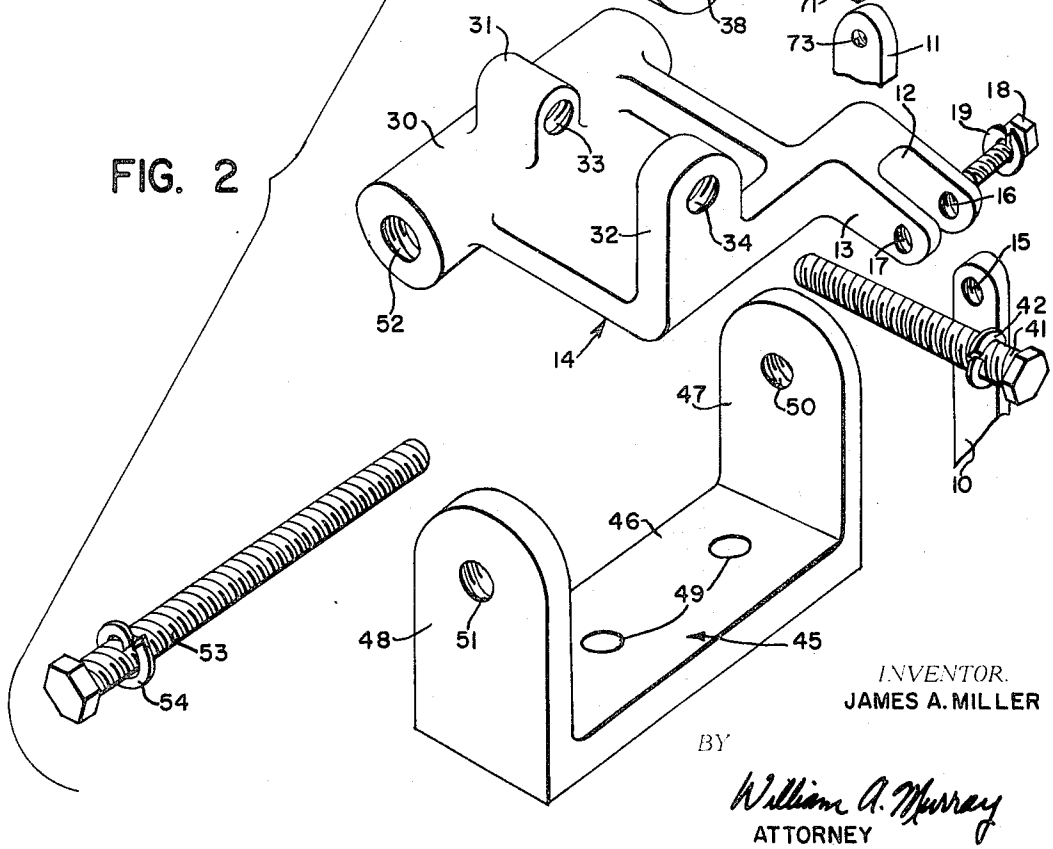


FIG. 2



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United States Patent Office 3,388,609 Patented June 18, 1968

3,388,609

SINGLE LEVER CONTROL MECHANISM

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Filed Mar. 22, 1967, Ser. No. 625,050
6 Claims. (Cl. 74—471)

ABSTRACT OF THE DISCLOSURE

A single lever valve control mechanism for operating a plurality of control elements that includes first and second control arms extending to spaced apart control elements, the arms being interconnected to swivel about an axis formed by a threaded bolt extending through tapped openings in the respective arms with one of the arms being supported on a main support frame to pivot about an axis, substantially at right angles to the aforementioned axis, and formed by a threaded stud extending through tapped openings in the one arm and the support frame.

Background of the invention

The present invention relates to a single lever control mechanism for operating a pair of spaced apart control elements, preferably hydraulically controlled elements, and to utilize the single lever control so that it may adjust one of the control elements without effecting adjustment or movement of the other control element.

In U.S. Patent 2,979,081 which issued to Messrs. J. E. McCanse and D. C. Ager on Apr. 11, 1961 and in U.S. Patent 3,131,574 which issued to Mr. J. L. Clingerman on May 5, 1964, there are shown and described single lever control mechanisms. Each of the control mechanisms shown and described therein is composed of a pair of control arms interconnected so that one of the arms may move relative to the other without effecting movement thereof. The other of the arms is supported on a main frame support to pivot about an axis that permits the latter arm to move without effecting movement or adjustment of the other arm. A single lever is carried on the respective arms so that movement of the arms may be manually controlled. The pivotal interconnection between the two arms is substantially at right angles to the pivotal interconnection between the one arm and the main frame or support. The ends of the respective arms are connected to spaced apart control elements which in the cases of the aforementioned patents are valve controls.

The problem that exists in either of the above-described mechanisms is that there are numerous pivotal interconnections, each of which must have some tolerance and consequently there is considerable play or looseness in the control mechanism. Since the hydraulic valve controls are, in most instances, sensitive to slight adjustments and must be moved in a very accurate manner, this looseness or play in the basic valve control mechanism often creates a problem.

Summary of the invention

With the above in mind it is the primary object of the present invention to provide a valve control mechanism for a system having at least two spaced apart control elements. The valve control mechanism will be composed of first and second control arms that have terminal ends connected to the control elements. The control arms have threaded openings aligned with one another and a threaded stud is threaded through the openings and operates as a pivot by which one of the arms may be moved angularly, relative to the axis of the stud, in respect to the other arm. The other arm is supported on a frame or support and the support and arm have axially aligned openings which are also threaded. A second stud is threaded through the

openings of the frame and arm so that the latter arm may move angularly about the stud. The two studs are disposed substantially at right angles to one another and there is sufficient spacing between the two arms about their common stud and sufficient spacing between the one arm and the support about their common stud so that some axial movement could occur along the studs. A single lever is connected to the arms and operates to move either of the arms individually or to move both arms simultaneously. The outer ends of the arms are connected to their respective control elements by threaded studs that extend through the arms and through the control elements.

By such an arrangement in the control mechanism, any movement of the single lever on the mechanism will immediately cause adjustment of one of the control elements. There will be very little play in the entire operation since the nature of a threaded joint eliminates most of the play. Also, the joints about the studs will remain relatively tight since the threaded joints will have minimum wear.

Brief description of the drawings

FIG. 1 is an overhead perspective view of the control mechanism.

FIG. 2 is an overhead perspective and exploded view of the various parts making up the control mechanism.

A first control element, shown partially at **10**, and a second control element, shown partially at **11**, may be links connected to hydraulic valves or may be links connected to mechanical-type systems. The exact use and purpose of the control elements are not of particular importance relative to the present invention. The terminal end, composed of a pair of spaced apart ears **12, 13**, of a first control arm **14** is connected to the first control element **10**. The upper end of the control element **10** has a threaded opening **15** that is aligned axially with threaded openings **16, 17** in the respective ears **12, 13**. The threads of the openings **16, 17** must be in time so that the threads of a bolt can simultaneously be engaged with the threads of both openings **16, 17**. A short threaded bolt or stud **18** is threaded through the openings **15–17** and consequently the control element **10** may pivot or swivel on the stud **18**. There is axial spacing between the sides of the control element **10** and the inner surfaces of the respective ears **12, 13** to permit some axial adjustment of the control element **10** during assembly to time the threads of opening **15** with the threads in openings **16, 17** and to permit some axial movement of the control element **10** in its swivel motion. A lock washer **19** is provided on the stud **18** and as the head of the bolt or stud **18** is tightened, the lock washer **19** will prevent the stud from loosening in the openings **15–17**.

A second control arm **20** has a terminal outer end composed of spaced apart ears **21, 22** connected to the upper portion of the universal block **70**. The upper portion of the universal block **70** has a threaded opening **23** axially aligned and timed with threaded openings **24, 25** in the respective lugs **21, 22**. A short stud **26** is threaded through the openings **23–25** so as to permit the universal block **70** to swivel or pivot on the stud **26**. A lock washer **27** is provided on the stud **26** and prevents it from slipping or loosening due to the swiveling action of the universal block **70** on the stud **26**.

The universal block **70** has a lower portion composed of depending ears **71, 72** connected to the upper end of the control element **11**. The upper end of the control element **11** has a threaded opening **73** axially aligned and timed with threaded openings **74, 75** in the respective lugs **71, 72**. A short stud **76** is threaded through the openings **73–75** so as to permit the control element **11** to swivel or pivot on the stud **76**. A lock washer **77** is provided on the stud **76** and prevents it from slipping or loosening due to the

swiveling action of the control element 11 on the stud 75.

The control arm 14 is provided with a hub portion 30 having an upwardly projecting boss section 31. The arm 14 also has an upwardly projecting lug or ear 32 spaced from but generally in alignment with the lug or boss 31. The lugs 31, 32 have axially aligned and timed tapped openings 33, 34 respectively. The second arm 20 has a pair of depending lugs 37, 38 that fit on opposite sides of the lug 31. The lugs 37, 38 have axially aligned and timed tapped openings 39, 40 aligned and time with the tapped openings 33, 34. A bolt 41 is threaded through the respective openings 34, 40, 33 and 39. A lock washer 42 is provided adjacent the head of the bolt 41 for locking the bolt against movement in respect to control arm 14. As may best be seen from viewing FIG. 1, there is axial spacing provided between the lugs 37, 38 and the lugs 31, 32. This is provided so that some axial adjustment can be made during assembly and so that some axial movement may occur when the second arm 20 is swiveled about the axis of the stud or bolt 41.

A U-shaped support frame 45 has a horizontal underside 46 and a pair of upwardly projecting ears 47, 48. The underside 46 is provided with a pair of openings 49 through which bolts may attach the support frame 45 to a supporting structure. The ears 47, 48 are provided with axially aligned and timed tapped openings 50, 51 respectively that are axially aligned with the hub portion 30 of the first control arm 14. The hub 30 has a central threaded opening 52 and a bolt 53 is threaded through the respective openings 50–52. Again a lock washer 54 is provided to fix the bolt 53 against movement in respect to frame 45 and to prevent the bolt 53 from becoming loose or threading out of the respective openings. There is sufficient spacing between the ends of the hub portion 30 and the inner surfaces of the ears 47, 48 to permit sufficient axial adjustment during assembly and to permit sufficient axial movement of the hub 30 on the bolt 53 so that the control arm 14 may swivel relative to the bolt 53.

A single manual control lever, shown only partially at 60, is connected to the upper side of the second control arm 20 substantially directly above the bolt 41. As may be readily appreciated, movement of the control lever 60 at right angles to the stud 41 causes the control element 11 to move vertically. Movement of the control lever 60 at right angles to the stud or bolt 53 causes the control element 10 to move vertically. The control lever 10 may move in a direction having components at right angles to the studs 53, 41 and consequently cause vertical adjustment of both control elements 10, 11 with a single adjustment of the control lever.

I claim:

1. A valve control mechanism for a system having at least two spaced apart control elements one of said elements being offset to the other, comprising: a first control arm extending from a first of said control elements; a second control arm extending from a second of said valve control elements, the first and second control arms having threaded openings axially aligned with one another; a first threaded stud threaded through the openings for pivotally interconnecting the control arms whereby said second control arm may adjust its respective control element by movement about the stud axis; a support frame; axially aligned threaded openings in the frame and first arm; a second threaded stud threaded through the openings in the frame an first arm for pivotally mounting the first control arm on the frame whereby the first arm may adjust its respective control element by movement about the axis of the second stud; and a manual control lever mounted on said control arms effective in movement in one direction to adjust said second control arm abut the axis of the first stud and in movement in a second direction to adjust said first control arm about the axis of the second stud.

2. The structure as set forth in claim 1 in which the frame has a pair of spaced lugs and the openings in the frame are aligned threaded openings in the lugs, the first arm has a hub portion disposed between the lugs and the threaded opening in the first arm is a threaded axial opening in the hub aligned with the threaded openings of the lugs and the second stud extends through the lugs and axial opening.

3. The structure as set forth in claim 2 in which there is axial spacing between the ends of the hub and the ears to permit axial movement of the hub as the lever pivots the first arms on the second stud.

4. The structure as set forth in claim 1 in which the first and second control arms are axially spaced apart along the first stud to permit relative angular movement between the first and second arms on the first stud and the first arm is axially spaced from the support frame along the second stud to permit angular movement of the first arm on the second stud.

5. The structure as set forth in claim 1 in which the control elements are pivotally connected to the respective arms by threaded studs that are threaded through threaded openings in the respective arms and the control elements.

6. A valve control mechanism for a system having at least two spaced apart control elements one of said elements being offset to the other, comprising: a first control arm extending from a first of said control elements; a second control arm extending from a second of said valve control elements, the first and second control arms having openings axially aligned with one another with the openings of the second member being threaded; a first threaded stud extending through the openings for pivotally interconnecting the control arms, the stud being fixed against rotation in respect to the first member and being threadedly received in the threaded opening of the second member whereby said second control arm may adjust its respective control element by movement about the stud axis; a support frame; axially aligned openings in the frame and first arm with the opening in the first arm being threaded; a second threaded stud extending through the openings in the frame and first arm for pivotally mounting the first control arm on the frame, the second stud being fixed against movement in respect to the frame and being threadedly received in the threaded opening of the first arm whereby the first arm may adjust its respective control element by movement about the axis of the second stud; and a manual control lever mounted on said control arms effective in movement in one direction to adjust said second control arm about the axis of the first stud and in movement in a second direction to adjust said first control arm about the axis of the second stud.

References Cited

UNITED STATES PATENTS

2,103,729	12/1937	Leighton	287—85
3,131,574	5/1964	Clingerman	74—471

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