May 7, 1963 R. A. PETERSON 3,088,328

MULTIPLE ACTUATING LEVER

Filed July 24, 1961 2 Sheets-Sheet 1

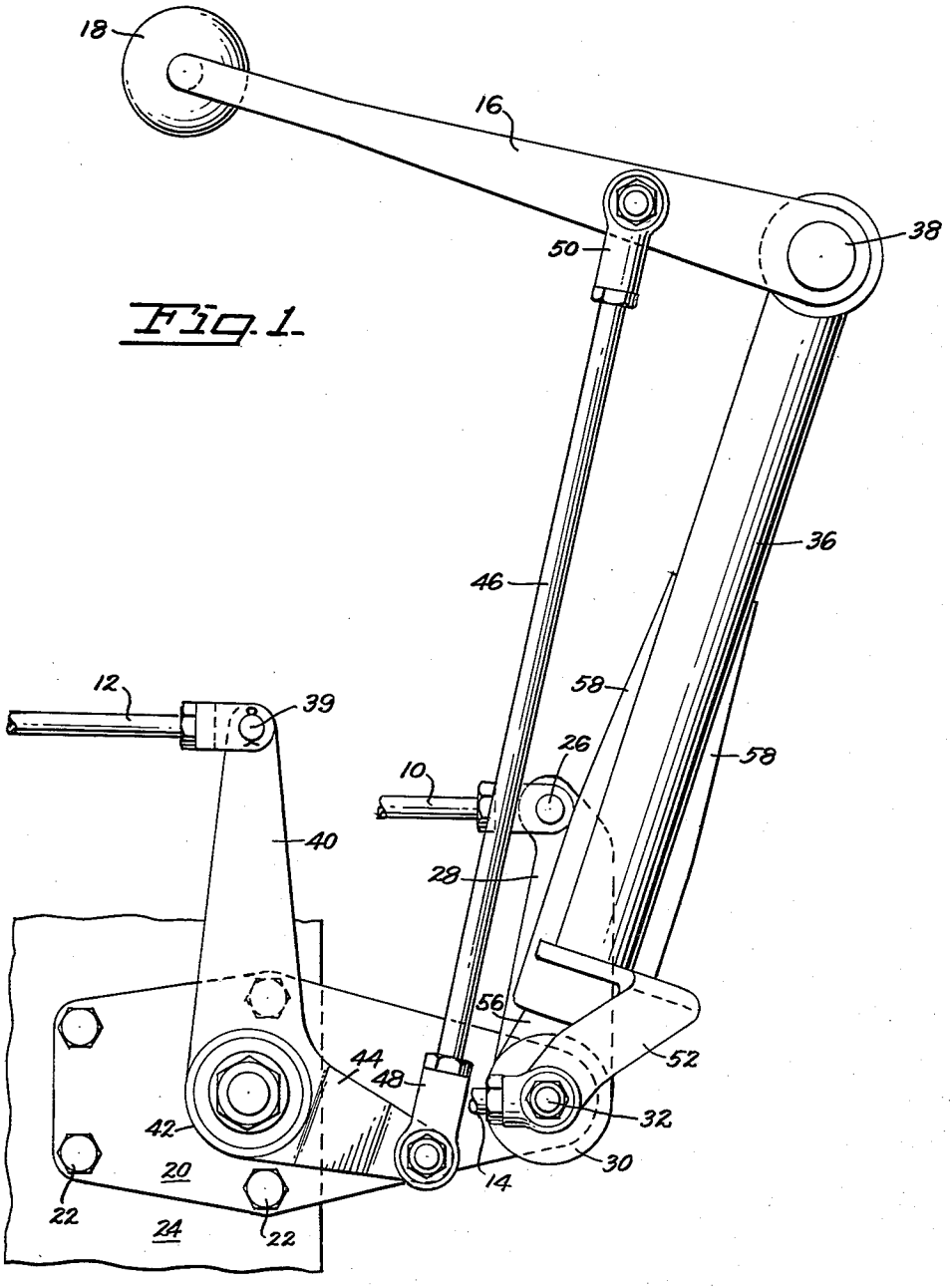

Fig. 1

INVENTOR.
ROBERT A. PETERSON
BY
Fryer & Tjensvold
ATTORNEYS

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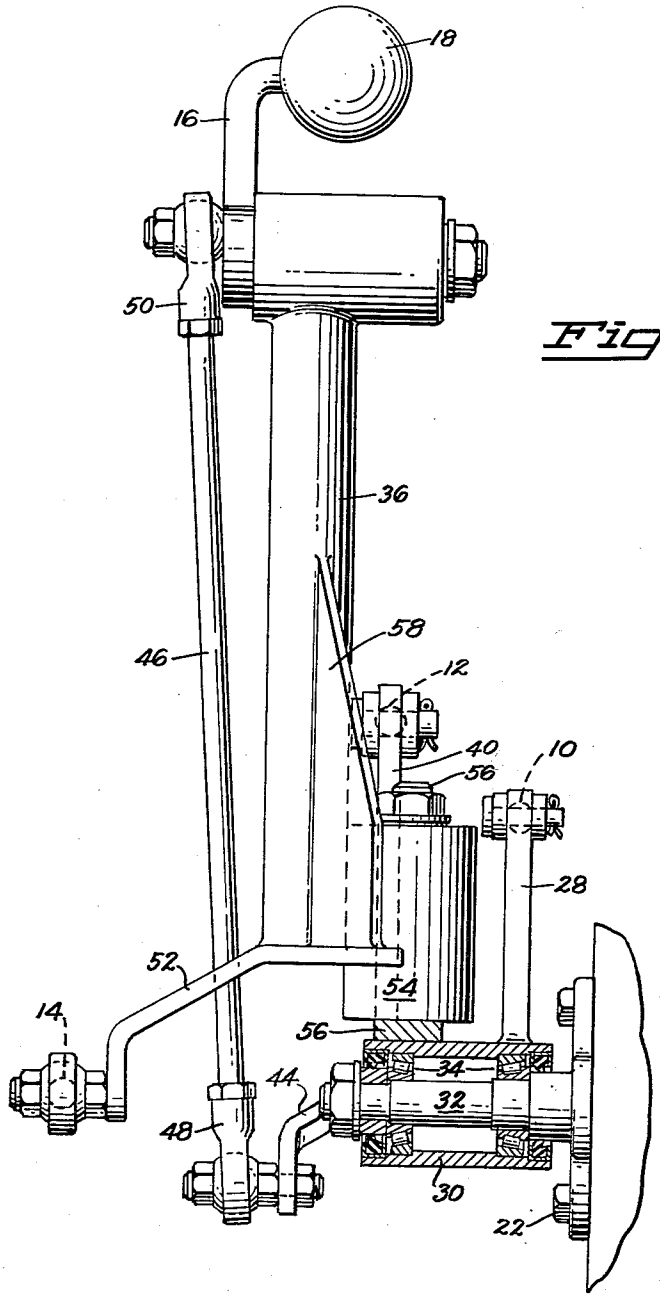

Fig. 2.

INVENTOR.
ROBERT A. PETERSON
BY
Fryer & Tjensvold
ATTORNEYS.

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MULTIPLE ACTUATING LEVER

Robert A. Peterson, San Leandro, Calif., assignor to Caterpillar Tractor Co., Peoria, Ill., a corporation of California

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1 Claim. (Cl. 74—471)

This invention relates to means for controlling a plurality of valves with a single manually actuated lever capable of movement in several directions.

The invention has many uses but is particularly applicable to earthmoving equipment and the like in which hydraulic power is employed for adjusting various parts of a single machine. One typical example of such a machine is a tractor mounted loader bucket with a clam shell-type bucket having an articulate front closure member for retaining a large load sometimes referred to as a clamp. Such machines employ hydraulic motors or jacks for raising lift arms which carry the bucket. A second set of such jacks is employed for tilting the bucket between load, carry and dump positions, and a third set of jacks is employed to actuate the bucket closure member. Each set of jacks has an associated control valve, usually of the spool-type, for directing fluid from a source under pressure selectively to opposite ends of the jacks. Thus the operator of such a machine is confronted with the necessity of actuating three separate levers with one hand while his other hand and his feet are employed in steering, accelerating and decelerating and reversing direction of a tractor upon which the loader is mounted.

It is an object of the present invention to provide means through which all three valves of such a machine can be actuated by movement in different directions of a single manually controlled lever.

A further object of the invention is the provision of leverage through which substantially rectilinear motion can be selectively imparted to three separate elements independently of each other through movement of a single element.

Further and more specific objects and advantages of the invention and the manner in which it is carried into practice are made apparent in the following specification wherein reference is made to the accompanying drawings.

In the drawings:

FIG. 1 is a view in side elevation of an assembly of levers embodying the present invention; and

FIG. 2 is an elevation from the front or right hand side of the assembly shown in FIG. 1.

Since valves of various types are employed in hydraulic controls, no valves are illustrated herein. Any valve, however, whether it be of the sliding spool or rotary type can be actuated by rectilinear or substantial rectilinear motion such as is attained by the use of a crank or a connecting rod.

FIG. 1 of the drawings shows three connecting rods at **10**, **12** and **14**, each of which may be moved substantially axially of itself independently of the others and without regard to the positions at which the others are set, by manipulation of a hand lever **16** shown as having a spherical hand piece **18** thereon. Each of the rods **10**, **12** and **14** may be assumed as operatively connected with a valve to be controlled to adjust the same from a central or hold position to positions on opposite sides of the central position for actuating hydraulic jacks and the devices moved by them in opposite directions.

The entire assembly shown in FIGS. 1 and 2 is carried on a plate **20** adapted to be secured as by cap screws **22** to the body of a tractor adjacent the operator's station, a portion of which is shown at **24**. The connecting rod **10** is connected as by a clevis **26** with a lever **28**. The

lever **28**, as best shown in FIG. 2, is fixed to a sleeve **30** adapted to oscillate about a trunnion **32** through suitable anti-friction bearings shown at **34**. A post **36** is connected by means presently to be described and rises from the sleeve **30**. At its upper end the post carries a bearing sleeve similar to that shown at **30** and a trunnion **38** pivotally mounted in the sleeve carries the hand lever **16**. Thus upon forward and reverse movement of the hand lever about the transverse axis provided by the bearing sleeve **30** (right and left as viewed in FIG. 1) the rod **10** is moved. This rod may, in the example given, actuate a valve for raising and lowering a loader bucket.

Tilting of the same bucket, as between its carry and its dump position, may be accomplished through movement of the connecting rod **12**. This rod is suitably connected as at **39** with one end **40** of a bellcrank lever carried on a sleeve **42** identical in construction and mounting to the sleeve **30**. The opposite end **44** of the bellcrank is connected by a rod **46** through universal or ball and socket joints **48** and **50** with the hand lever **16**. Vertical swinging movement of the hand lever **16** about the axis of trunnion **38** therefor actuates the rod **12**.

The rod **14** may, in the case of a clam shell-type loader actuate the valve which controls opening and closing of the clamp or bucket closure. This rod is pivotally connected with a lever **52** which, as best shown in FIG. 2, extends outwardly and downwardly from the bottom of the post **36**. As also best shown in FIG. 2, the connection between the post **36** and sleeve **30** is made through an identical bearing sleeve **54** mounted in the same manner as the sleeve **30** on a trunnion **56** which is welded or otherwise suitably secured to the top of the sleeve **30**. Bracket members **58** and one end of the lever **52** are also securely welded to each other, to the post **36** and to the sleeve **54** to form a rigid connection which enables the post **36** to pivot or oscillate in a small arc about the center of the bearing sleeve **54** which provides an axis parallel to the post. This in turn imparts swinging movement to the lever **52** for moving the rod **14** in the desired manner. This swinging movement may be accomplished by sidewise movement of the hand lever **16** which would be movement from right to left as viewed in FIG. 2.

The last referred to swinging movement of the post **36** about the center of the sleeve **54** is obviously accomplished without disturbing the position of the lever **28** and rod **10** and, since the center of pivotal movement between the rod **14** and lever **52** is in axial alignment with the trunnion **32** about which the sleeve **30** turns, forward and reverse swinging movement of the post **36** about the axis of this trunnion for moving the rod **10** does not effect the rod **14**. Very slight endwise movement of the link **46** which acts in adjusting the position of the rod **12** will take place both in the forward and reverse swinging movement of the post **10** and in its pivotal movement about the center of sleeve **54**. This movement which in effect tends to lengthen and shorten the distance between the ball and socket fittings **48** and **50** on the ends of rod **46** will be reacted in the hand lever **16** which can move upwardly and downwardly more freely than the valve controlled by the rod **12** can be adjusted. Consequently any one of the rods **10**, **12** and **14** can be moved to adjust the position of the valve controlled by it independently of the others and without regard to the particular position in which the others are disposed at the time that the adjustment is made.

With the lever assembly of the present invention, an operator is freed of the necessity of selecting the proper one of three levers for controlling three valves and can, if desired, rest his hand at all times on the single hand lever which is capable of movement in three different directions for performing three different adjustments of the implement with which he is working.

I claim:

In combination with three substantially parallel control rods: a fixed support adjacent said rods, a single hand lever for imparting endwise movement selectively to said rods, a post pivotally mounted on the support for swinging movement about a first axis disposed transverse to the direction of movement of said rods, an arm fixed to the post for movement with the post about the same axis, a pivotal connection between said arm and a first of said rods, said post also being mounted for movement about a second axis transverse to the direction of movement of the rods and at a right angle to the first axis, a second arm fixed on the post for movement with the post about the second axis, a pivotal connection between said second arm and a second of said rods, said hand lever being pivoted to the post to move it about said first and second axes, a bell crank pivoted on said fixed support, a pivotal connection between one end of the bell crank and the third of said rods, and a link connecting the opposite end of said bell crank with said hand lever to move the third rod when the hand lever is swung about its pivotal connection with the post.

References Cited in the file of this patent

UNITED STATES PATENTS

2,191,842	Back	Feb. 27, 1940
2,549,969	Hesemann	Apr. 24, 1951
2,679,327	Hren	May 25, 1954
2,877,660	Rush	Mar. 17, 1959
2,959,230	Doman	Nov. 8, 1960

FOREIGN PATENTS

1,223,273	France	Feb. 1, 1960