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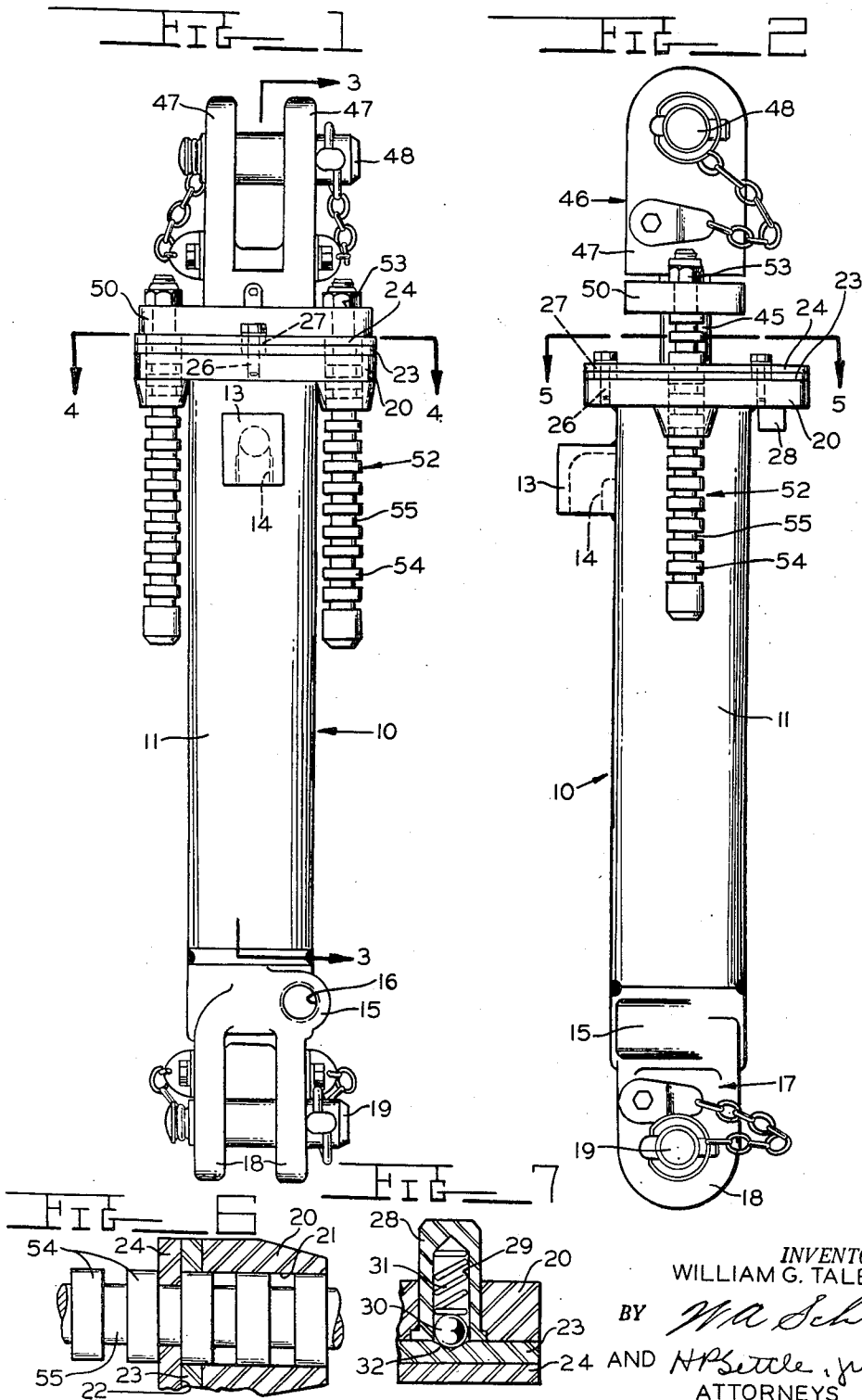
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2,804,944

REMOTE CONTROL CYLINDER

Filed Feb. 5, 1953

2 Sheets-Sheet 1



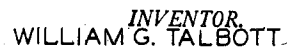
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2 Sheets-Sheet 2



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2,804,944

REMOTE CONTROL CYLINDER

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3 Claims. (Cl. 188—67)

The present invention relates to a fluid-pressure actuated power unit and more particularly to a hydraulic cylinder having an adjustable stop mechanism for limiting the cylinder stroke.

The hydraulic cylinder of the present invention is particularly adapted for use in farm equipment to limit the stroke of the cylinder to thereby determine the extent of actuation of a plow, cultivator, combine header, or the like to which the cylinder is connected. Industry standards have been established which require that the retraction stroke of a double acting cylinder be utilized to lower a plow, cultivator, etc., into working position, with the extension stroke being used to raise the implement to a transport position. Those skilled in the art will appreciate the desirability of mechanically limiting the extent of retraction of the cylinder piston to accurately determine the working position of the plow and to provide a limit to which the implement may be subsequently lowered for later uniform results.

The present invention now provides an improved adjusting mechanism for a hydraulic cylinder whereby the above recited advantages can be obtained. More particularly, the retraction stroke of the cylinder is limited by providing a longitudinally adjustable stop against which the cylinder piston clevis abuts. The adjustable stop takes the form of a yoke movable longitudinally along the cylinder piston rod and carrying a pair of grooved positioning rods retained in a selected position by indexing means carried by the cylinder housing. The indexing means engage the positioning rods to adjustably locate the yoke along the piston rod, so that abutment of the piston clevis with the yoke stops piston movement.

It is, therefore, an important object of the present invention to provide an improved fluid pressure actuated motor having an adjustable stop mechanism for limiting the piston stroke.

Another important object is the provision of an improved adjustable stop mechanism for limiting the extent of retracting movement of a double acting hydraulic cylinder.

It is a further object to provide an improved hydraulic cylinder having a stop mechanism for limiting movement of the cylinder piston including a yoke adapted to be engaged by the cylinder piston retraction and means for adjustably positioning the yoke longitudinally of the piston.

On the drawings:

Figure 1 is a plan view of a hydraulic cylinder of the present invention;

Figure 2 is a side elevational view of the cylinder of Figure 1;

Figure 3 is a longitudinal sectional view of the cylinder taken along the plane 3—3 of Figure 1;

Figure 4 is a sectional view taken along the plane 4—4 of Figure 1;

Figure 5 is a sectional view taken along the plane 5—5 of Figure 2;

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Figure 6 is a fragmentary sectional view taken along the plane 6—6 of Figure 5; and

Figure 7 is a fragmentary sectional view taken along the plane 7—7 of Figure 5.

As shown on the drawings:

In Figure 1, reference numeral 10 refers generally to a hydraulic cylinder of the present invention, preferably of the double acting type.

The cylinder 10 comprises a central tubular portion 11 having a cylindrical bore 12 defining a cylindrical inner pressure chamber. The center portion 11 is provided with an upstanding boss 13 adjacent one end thereof provided with an interior passage 14 for the admission of fluid to one end of the bore 12, and with a second lateral boss 15 adjacent the other end thereof defining a similar interior passage 16 for admitting fluid for the other end of the cylinder.

The end of the cylinder which carries the boss 15 is provided with a terminal clevis 17 having a pair of attachment ears 18 for attaching the cylinder to an implement or the like and having transversely aligned apertures receiving therethrough a quick detachable mounting pin 19.

The other end of the cylinder has welded thereto a generally circular bottoming plate 20 concentric with the cylindrical central portion 11 of the cylinder. The plate 20 is provided with laterally spaced, longitudinally extending apertures 21 (Figure 6) for purposes to be hereinafter more fully described.

The outer side surface 22 of the plate 20 abuts a positioning plate 23 which is confined between the plate 20 and an immediately adjacent second positioning plate 24. The plates 23 and 24 are substantially identical and are secured together by suitable means, as by spot welding or the like. The plates 23 and 24 are provided with vertically aligned registering, generally arcuate apertures 25 which are struck about the axis of the cylindrical portion 11, and these apertures receive therethrough pivot bolts 26 which are retained by the plate 20 and which are surrounded by bushings 27 fitting within the apertures. It will be appreciated that the bolts 26, the bushings 27, and the slots 25 accommodate arcuate movement of the plates 23 and 24 relative to the plate 20.

A stop means is also provided for retaining the plates 23 and 24 in a chosen adjusted position. This means is best illustrated in Figure 7, and includes a detent cup 28 press fitted in the plate 20 and having an interior recess 29 opening toward the plates 23 and 24. A ball detent 30 is disposed in the open-end of the cup and is urged toward the adjacent portion of the plate 23 by a detent spring 31. The plate 23 is provided with a pair of spaced detent recesses 32 which received the ball detent 30 to adjustably position the plates 23 and 24 at either of their extreme positions, as determined by bottoming of the bushings 27 against the edges of the slots 25.

The plates 23 and 24 are each provided with a pair of diametrically opposed key hole slots 33 and 33a, respectively. More particularly, these slots 33 are concentric with the cylinder 10 and include enlarged arcuate portions 34 and 34a and reduced arcuate portions 35 and 35a, respectively. The enlarged portions are elongated and the plates 23 and 24, which are identical, are reversed so that the larger portions 34 of the plate 23 register with the smaller portions 35a of the other plate 24, and vice versa. In addition, the enlarged portions 34 of the slots and the two plates overlap so as to provide an enlarged central, generally circular slot portion 36 for a purpose hereinafter more fully described. Inasmuch, as the two plates are secured together to form a rigid unit, it will be appreciated that the plate apertures form key hole shaped passages on either side of the plates, and these apertures are utilized to position the cylinder stop means as will be hereinafter explained.

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The cylindrical bore 12 of the central portion 11 of the cylinder 10 receives therein a piston 40 having an enlarged piston head 41 provided with a peripheral seal ring 42 engageable with the interior bore wall. The piston is sealed within the bore 12 by a sealing head 43 positioned in the open end of the cylinder and having an axial aperture 44 through which the piston rod 45 projects. The free end of the piston 45 projecting beyond the cylinder carries an attachment clevis 46 similar to the clevis 17 including laterally spaced ears 47 having transversely aligned apertures receiving therethrough a quick attachment pin 48 similar to the pin 19 in the other end of the cylinder assembly.

Interposed between the clevis 46 and the plates 23 and 24 is a laterally extending yoke 50 having an enlarged axial aperture 51 through which the rod 45 projects and which is slidable along the length of the rod. The yoke 50 carries a pair of positioning rods 52 extending generally parallel to the piston rod 45 and inserted through the apertures of the positioning plates 23 and 24 and the bottoming plate 20. The positioning rods 52 are rigid with the yoke 50 and are connected thereto by suitable means, as by bolts 53 threaded on the rods to abut the yoke. The rods 52 are provided with axially spaced alternate lands 54 and grooves 55 formed integrally with the rods and which cooperate with the key hole slots 33 and 33a of the plates 23 and 24, respectively, as will now be described.

As best illustrated in Figure 6, the thickness of the identical plates 23 and 24 is slightly less than the axial dimension of a groove 55 of either of the rods 52. The enlarged central aperture 36 has a transverse dimension slightly larger than corresponding diameter of the rod lands 54, while the transverse dimension of the smaller slot portions 35 and 35a is slightly greater than the diameter of the grooved rod portions 55. When the two plates are positioned relative to the positioning rods 52 as illustrated in Figure 4, the rods extend freely through the central registering portions 36 of the slots 33 and 33a, and the yoke 50 may be freely adjusted along the length of the piston rod 45, so long as the clevis 46 is spaced from the plate 24 through a distance greater than the thickness of the yoke 50.

To secure the yoke 50 in an adjusted position along the length of the piston rod 45, it is only necessary to rotate the plates 23 and 24 in either direction to assume a position such as that illustrated in Figure 5. When the plates are thus rotated, the groove 55 of each rod which is aligned with the smaller portion 35 or 35a of one of the plates will be positioned within the smaller portions of the slots between a pair of adjacent lands 54. The land 54 which is external of the plates will prevent retraction of the yoke toward the cylinder, while the adjacent land 54 which is positioned in either the aperture 21 of the enlarged aperture portion 35 or 35a of the adjacent plate will prevent extension of the yoke along the rod 45. Accordingly, it will be seen that the yoke is locked in position against movement relative to the cylinder. Upon retraction of the piston 45, as by effecting the delivery of pressure fluid into the cylinder 12 through the boss aperture 14, the piston rod clevis 46 will abut the yoke 50 and will be halted in spaced relation to the adjacent end of the cylinders in accordance with the positioning of the yoke.

Not only does the present invention provide for the positioning of the yoke 50, but it also provides for the vernier adjustment thereof in increments equal to the thickness of the plates 23 and 24. This adjustment is accommodated by the fact that the groove 55 can be entered by either of the plates 23 or 24, depending upon which of the plates has a reduced slot portion 35 or 35a aligned with the groove. Thus, the plates, being adjustable in either arcuate direction, cooperate with the positioning rods to afford an accurate adjustment of the yoke to fixedly position the same axially of the rod 45.

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Thus, it will be appreciated that the present invention provides an improved cylinder construction whereby adjustment of the cylinder rod may be accomplished to stop movement of a piston within the cylinder. The vernier-type adjustment of the present invention increases the accuracy of control of the piston stroke, and the advantages in the operation of agricultural implements and the like will be readily understood by those skilled in the art.

I claim:

1. In a fluid motor having a cylinder member and a piston and connecting rod unit movable therein, said connecting rod having an attachment clevis secured to the free end thereof, the improvement comprising an adjustable stop for limiting movement of said piston and rod assembly, said stop including a yoke slidable along said rod and projecting laterally therebeyond, a positioning rod secured to said yoke and extending parallel to said actuating rod to lie alongside said cylinder, said positioning rod having alternate lands and grooves disposed along the length thereof, and a pair of plates carried by said cylinder member for rotary movement in either direction from a central position, said plates having arcuate registering apertures therein of key hole shape, the apertures of said plates having larger portions of a diameter larger than said positioning rod lands and smaller portions of lesser diameter than said lands, the larger portions of the plate apertures being in registry centrally of said apertures to provide a space through which said positioning rods may be longitudinally moved to position said yoke along said actuating rod, and the smaller portion of each of said plates registering with the larger portion of the other plate at either extremity of said apertures, so that pivotal movement of said plates will effect entry of an adjacent grooved portion of said positioning rod into the smaller portion of one of said plates to prevent longitudinal movement of said positioning rod due to the impossibility of passing the longitudinally adjacent rod land therethrough, whereby said yoke is secured in an adjusted relation to said cylinder to engage said clevis and limit movement of said piston and rod assembly.

2. In a fluid motor having a cylinder member and a piston and connecting rod assembly slidable therein, said rod having a connector at the free end thereof, the improvement comprising an adjustable stop means for limiting the movement of said assembly, comprising a yoke disposed transversely of said connecting rod and provided with an opening through which said rod extends and is shiftable therethrough, said connector projecting laterally beyond the side of said rod and being engaged by said yoke when the piston moves towards the opposite end of the cylinder to limit such movement of the piston, a pair of supporting rods rigidly attached to said yoke and extending longitudinally along opposite sides of said cylinder member, means on opposite sides of said cylinder member apertured to slidably receive said supporting rods, and means for releasably securing said supporting rods in longitudinally adjusted position in said apertured means, said rods having alternate lands and grooves disposed along the lengths thereof, said last-mentioned means including a relatively movable plate carried by said cylinder member for limited rotation about the axis of the cylinder member and having apertures therein through which said supporting rods project, said apertures having a larger portion accommodating sliding movement of said lands therethrough, and a smaller portion preventing the passage of said lands, the margin of the smaller portion being selectively engageable with one of said grooves to lock said rods to said plate and thereby secure said yoke in an adjusted position.

3. In a fluid motor having a cylinder closed at one end, a piston within the cylinder, and a connecting rod projecting from the opposite end of the cylinder, the connecting rod having a connector at the free end thereof projecting laterally beyond the side of the rod, the improvement comprising an adjustable stop means for

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limiting the movement of said piston and connecting rod towards the closed end of the cylinder, said stop means including a yoke slidable along said rod beyond the end of the cylinder, at least one positioning rod carried by said yoke and extending parallel to the connecting rod, and a positioning plate mounted on the cylinder for limited rotation coaxially of the cylinder and piston and having a keyhole slot therein for receiving each positioning rod, each positioning rod having axially spaced lands and grooves, said lands being of a size to pass through the larger portion of the keyhole slot to accommodate sliding adjustment of said yoke lengthwise of the connecting rod, and said lands being larger than the

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smaller portion of said keyhole slot, whereby rotation of the positioning plate engages the margins of a slot adjacent the smaller end thereof within a groove of each positioning rod to lock the positioning rod and yoke in adjusted position.

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