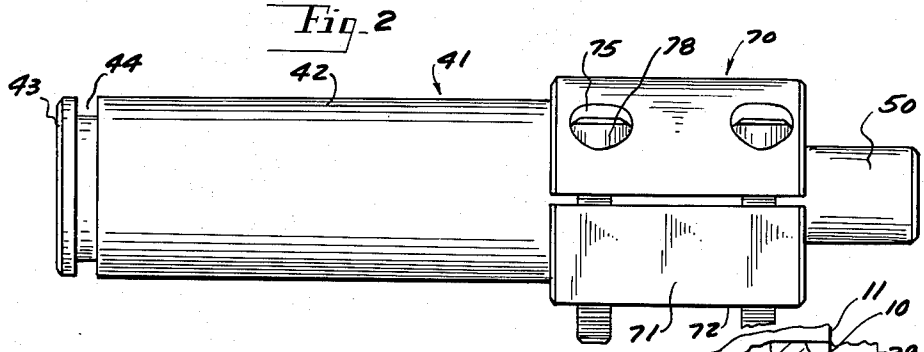
March 21, 1961 L. F. BLATT ET AL 2,975,762

SINGLE ACTION-QUICK RETURN-TOOL AND DIE CYLINDER ASSEMBLY

Filed Feb. 23, 1960

Fig. 2



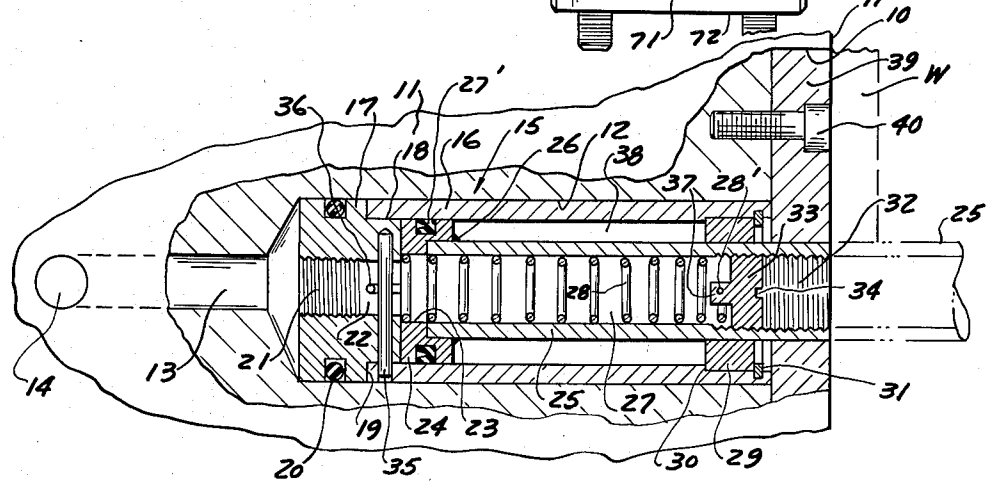


Fig. 1

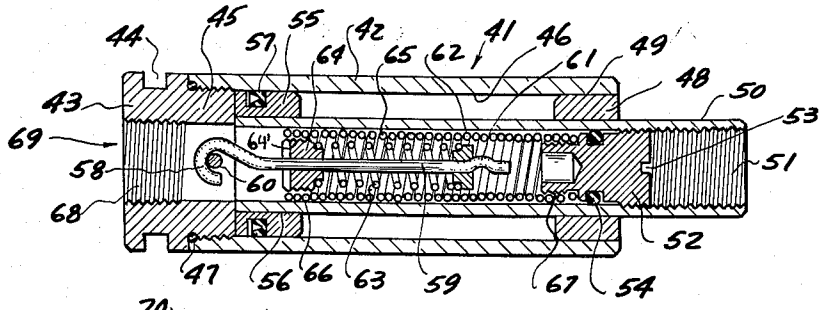


Fig. 3

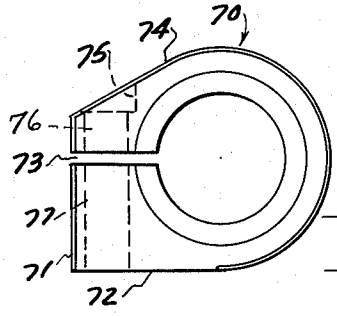


Fig. 4

INVENTORS.
LELAND F. BLATT.
BY JOSEPH M. JATCKO.

Robert A. Sloman
ATTORNEY

United States Patent Office 2,975,762 Patented Mar. 21, 1961

2,975,762

SINGLE ACTION-QUICK RETURN-TOOL AND DIE CYLINDER ASSEMBLY

Leland F. Blatt, Grosse Pointe Woods, and Joseph M. Jatcko, Detroit, Mich., both of 22930 Sherwood Ave., Warren, Mich.

Filed Feb. 23, 1960, Ser. No. 10,169

3 Claims. (Cl. 121—38)

This invention relates to cylinder assemblies, and more particularly to a single action quick return tool and die cylinder.

This application is a continuation in part of our co-pending patent application Serial No. 734,202, filed May 9, 1958 and relating to a cylinder assembly, now Patent No. 2,934,040.

This invention relates to cylinder assemblies and more particularly to a fluid operated piston which is normally spring-biased in one direction.

It is the object of the present invention to construct the cylinder and piston in such a manner that the spring employed therein will not interfere with the full longitudinal employment of the piston between cylinder heads.

It is a further object to provide a hollow piston rod communicating with a reciprocating piston and with a coiled tension spring nested within the piston rod and at one end adjustably secured thereto and with the opposite end of the spring secured to a portion of the cylinder.

It is a further object to provide an adjustable end wall construction closing off the outer end of the piston rod by which the initial tension of the spring may be regulated.

It is a further object to provide a cylinder assembly which is particularly adapted for use in dies such as for locating workpieces upon the working surface thereof.

It is a further object of the present invention to provide a single action quick return tool and die cylinder together with a novel mounting structure for effectively securing said cylinder upon the tool or die employed.

It is a further object to provide in said cylinder oppositely acting compression and tension springs to thus provide for a quick return of the piston and piston rod to a neutral inoperative position on release of pressure fluid from the cylinder.

These and other objects will be seen from the following specification and claims in conjunction with the appended drawing in which:

Fig. 1 is a fragmentary broken away and sectioned view of a die with one form of the present cylinder assembly mounted therein.

Fig. 2 is a side elevational view of a slightly different form of cylinder illustrating the mount therefor.

Fig. 3 is a longitudinal section thereof.

Fig. 4 is an end view of said mount.

It will be understood that the above drawing illustrates merely a preferred embodiment of the invention and that other embodiments are contemplated within the scope of the claims hereafter set forth.

Referring to the drawing, a portion of a die 11 is fragmentarily shown, as illustrative of one environment of use of the present cylinder assembly, said die having at its right end a working surface over which is slidably positioned the workpiece W shown in dotted lines and which is adapted for registry with the edge of the piston rod for purposes of location.

Longitudinal bore 12 is formed within die 11 and terminates at one end in a tapered opening which joins

passage 13 having an inlet 14 by which fluid under pressure may be applied to the working cylinder hereafter described.

The opposite end of bore 12 terminates in the counterbore 10 of increased diameter adapted to receive cylinder retaining disc 39 secured to the die by the socket bolts or fasteners 40.

The cylinder assembly, generally indicated at 15, includes elongated barrel 16 having at one end thereof cylinder head 17 whose reduced cylindrical portion 18 snugly projects into the bore of said barrel. Said cylinder head is fixedly secured to the barrel at points 19 by welding or brazing or by swedging.

Cylinder head 17 has an exterior annular groove supporting the O-ring seal 20 which cooperatively engages the adjacent wall of die 11 defining bore 12.

Head 17 is centrally apertured and threaded at 21, and is adapted to receive a fitting, or otherwise is in communication with passage 13 in order to receive fluid under pressure which may be compressed air or liquid. The threaded opening 21 terminates in axial passage 22 which communicates with the internal bore 23 of piston 24 positioned within barrel 16.

Elongated hollow piston rod 25 having bore 27 projects into one end of piston 24 and is fixedly secured thereto as by the welds 26.

Elongated tension spring 28 is positioned within piston rod 25. One end of said spring is looped at 36 around transverse retaining pin 35 which extends through a portion of cylinderhead 17 and across passage 22 therein for effectively anchoring one end of said spring.

An axially apertured second cylinder head 29 is snugly positioned within barrel 16 at its opposite end against shoulder 30 and is retained therein by a conventional locking ring 31. Said cylinderhead may be secured within said barrel by any other means such as by welding or swedging.

Piston rod 25 is slidably positioned through cylinderhead 29 and is adapted for movement within a central aperture of retaining disc 39. Upon the application of fluid pressure piston rod 25 will move to the dotted line position shown beyond the work surface of die 11, i.e., beyond the outer face of disc 39, thus serving as a locating means for workpiece W.

With piston 24 in the retracted inoperative position shown under the action of spring 28, the outer end of rod 25 registers with the outer surface of disc 39. Said outer end is interiorly threaded at 32 for adjustably receiving the rod closure 33. Transverse slot 34 is formed in the outer surface of said closure to facilitate threaded adjustment of said closure down into the end of rod 25.

Axial boss 37 projects inwardly from said closure and is transversely apertured to retainingly receive the opposite free end of coiled spring 28 at 28'.

Piston 24 has an annular groove receiving the V-seal 27' for cooperative sliding engagement with the bore of barrel 16 completing the assembly of the cylinder shown in Fig. 1.

In normal operation pressure fluid delivered at inlet 14 and through passage 13 is transmitted through openings 21 and 22 to the interior of piston rod 25 applying initial pressure upon the interior surface of closure 33. This will cause initial longitudinal movement of said piston rod against the tension of spring 28. After an initial movement pressure fluid is additionally applied to the outer end surface of piston 24 and said piston and piston rod move longitudinally of the cylinder barrel.

It is noted that piston 24 is free to move the full length of the bore of cylinder barrel 16 and may engage cylinder head 29. In other words the use of the coiled spring does not in any way interfere with the full stroke of piston

24 between the cylinder heads. Upon the release of the pressure fluid and the exhausting thereof, spring 28 will return the piston and piston rod to the solid line position shown in Fig. 1.

While pin 35 has been shown as one means of anchoring spring 28 to cylinderhead 17, it is contemplated that said spring may be otherwise secured to said cylinderhead for accomplishing the same purpose. Disc 39 provides an effective means for anchoring the cylinder assembly within die 11.

A slightly different form of cylinder assembly is shown in Figs. 2 and 3, being generally indicated at 41. Said cylinder assembly includes the elongated barrel 42 with bore 46. The cylinderhead 43 exteriorly grooved at 44 for the provision of sealing means, if employed, similar to the assembly shown at 36, Fig. 1, has a reduced portion 45, which is threaded into one end of the barrel, there being a suitable O-ring seal 47 interposed.

A centrally apertured head 48 is projected within the opposite end of barrel 42 and suitably secured therein by the longitudinal braze 49 or other suitable means. The hollow piston rod 50 is positioned axially within barrel 42 and is slidably received by the head 48. The outer end portion of rod 50 is interiorly threaded at 51 to adjustably receive the rotatable closure 52 transversely grooved at 53 in its outer surface to receive a screwdriver for adjustment. The closure 52 includes an annular groove containing the O-ring seal 54 cooperable with the bore of the hollow rod 50.

The centrally apertured piston 55 slidably positioned within the bore 46 of said barrel receives the opposite end of rod 50 which is secured therein by the braze 56, or other suitable means. The piston 55 also has an exterior annual groove to receive the packing or the seal 57 which cooperates with the bore 46 of barrel 42.

The elongated couple 59 axially positioned within rod 50 has a hooked end 58 which extends around the transverse pin 60 extending across the interior portion of head 43. The couple 59 is upset as at 61 in order to retain thereon the spool 62 which supports and axially retains one end of the compression spring 63 which is positioned around the couple shaft 59, extending towards the head 43.

The spring plug 64 is slidably mounted upon shaft 59 and retainingly projects into the opposite end of compression spring 63. Said plug is exteriorly threaded at 64' and operatively and retainingly extends into one end of the tension spring 65 which is concentrically mounted around the compression spring 63, within the hollow rod 50.

The opposite end of spring 65 bears against the closure 52 which is threaded into the corresponding portion of said spring and secured thereto at 67, Fig. 3.

The head 43 has an axial bore, a portion of which is threaded as at 68 adapted to receive a suitable fitting by which a source of compressed air or other fluid under pressure may be applied to the interior of barrel 42, as indicated at 69.

In the operation of the cylinder assembly shown in Fig. 3, the said cylinder may be positioned within the bore of a tool in the fashion shown in Fig. 1, or on the other hand, it may be mounted upon the machine tool by the mount, as indicated at 70, Fig. 2.

In operation pressure fluid is supplied to the interior of head 43 which communicates with the interior of rod 50 to thus cause an initial longitudinal movement of said rod, after which pressure fluid is applied to the exposed end area of piston 55. The outer spring 65 is secured at 67 to the piston rod for movement therewith. The opposite end of tension spring 65 is yieldingly secured to the plug 64. This plug is yieldingly restrained against longitudinal movement to the right by the compression spring 63 whose outer end is anchored to the cylinderhead 43 by the provision of the coupleshaft 59—58.

Accordingly in the initial operation tension through the outer spring 65 is transmitted to the plug 64 with the result that there is an initial compression of the inner spring 63 within the limit of the spring. At a certain point where there is no further compression of spring 63, the said plug 64 begins to act as a substantial anchor for the left end of the outer spring 65. Accordingly continued action of the rod 50 to the right places the spring 65 under increased tension.

Accordingly when the pressure fluid is removed or exhausted from the interior of the cylinder barrel 42 the two springs 65 and 63 act together to obtain a quick return movement of the piston rod and piston to the inoperation position shown in Fig. 3.

Referring to Fig. 2, there is provided a novel means for fixedly mounting the cylinder upon a machine tool or die assembly. For this purpose there is provided an elongated mount 70 having a cylindrical bore adapted to adjustably receive the barrel 42. The mount includes the base 71 having a flat undersurface 72 adapted to engage a portion of the tool or die to which the cylinder is to be applied. The said base upon one side of its cylindrical bore is transversely slit at 73 to thus provide a flexible clamping element 74 as a part of said base and an extension thereof.

This extension 74 has a pair of longitudinally spaced apertures 75 which terminate in the upright bores 76. Socket headed screws 78 in openings 75 extend through the bores 76 and 77 and are adapted for threaded engagement within corresponding openings within the top surface of the tool or die or other equipment to which the present cylinder is to be applied. The adjustability feature of the mount provides a means whereby the cylinder 41 may be adjusted longitudinally and thereafter effectively secured within the mount 70, Fig. 2, and at the same time fixedly secured to the tool or die or other equipment on which it is to be mounted.

Having described our invention, reference should now be had to the following claims.

We claim:

1. A single action quick return tool and die cylinder comprising an elongated barrel, axially apertured heads upon its opposite ends, one head adapted for communication with a source of fluid pressure, a centrally apertured reciprocating piston sealed in said barrel, a hollow rod in said barrel axially secured at one end to said piston and communicating with said one head, with the other end of the rod slidably projecting through the other head, a closure adjustably threaded and secured within said other end of the rod, a compression spring within said rod anchored at one end to said one head, a tension spring concentrically mounted loosely over said compression spring within said rod, with one end of said tension spring anchored to said rod closure for movement therewith, and a spring plug engaging the other end of said compression spring for compressing the same and secured within the other end of said tension spring providing a yielding anchor therefor.

2. In the single action quick return tool and die cylinder of claim 1, the mounting of said compression spring, including a couple shaft anchored at one end to said one head extending axially into said rod, a spool anchored at the inner end of said shaft, said compression spring mounted over said shaft and seated at one end against said spool, said spring plug slidably mounted on said shaft.

3. In combination with a die having an elongated bore therein terminating at one end in a counterbore of increased diameter adjacent its working surface, there being a passage in said die joining the other end of said bore adapted for connection to a source of fluid under pressure, a single action quick return tool and die cylinder including an elongated barrel snugly projected into said bore, axially apertured heads upon its opposite ends, one head adapted for communication with said source of fluid pressure, a centrally apertured reciprocating piston sealed in said barrel, a hollow rod in said barrel

axially secured at one end to said piston and communicating with said one head, with the other end of the rod slidably projecting through the other head, a closure adjustably threaded and secured within said other end of the rod, a compression spring within said rod anchored at one end of said one head, a tension spring concentrically mounted loosely over said compression spring within said rod, with one end of said tension spring anchored to said rod closure for movement therewith, a spring plug engaging the other end of said compression spring for compressing the same and secured within the other end of said tension spring providing a yielding anchor therefor, and a retaining disc apertured to receive said rod, nested in said counterbore and secured to said die.

References Cited in the file of this patent

UNITED STATES PATENTS

2,834,039	Sasse	May 13, 1958
2,934,040	Blatt et al.	Apr. 26, 1960

FOREIGN PATENTS

582,813	Great Britain	Nov. 28, 1946