ABSTRACT OF THE DISCLOSURE

A cocking device for automatic fire arms, which comprises a housing, a breech block axially movable in the housing and a hydraulically operable member is disposed in the housing for movement of the breech block. An actuator is guided in the housing for movement in a direction parallel to the direction of movement of and operatively connected with the breech block. The hydraulically operable member comprises a double-acting hydraulic cylinder and a piston reciprocating in the hydraulic cylinder. The longitudinal axis of the hydraulic cylinder is disposed parallel to the direction of movement of the actuator, and means are provided for operatively connecting the actuator with the piston.

The present invention relates to a cocking device for automatic fire arms, for example machine guns, having a hydraulically operable driver, by means of which a breech is movable in its axial direction.

The cocking of the breech of a gun, and its loading, are initiated by the recoil action. After fitting a cartridge belt and a belt feeder, or a cartridge magazine, to the gun, the breech is cocked manually or by a cocking device. In the case of machine guns which are not accessible to the gunner, e.g., machine guns of the kind mounted outside the turret of an armored vehicle, direct manipulation by hand is not applied. Instead, the gunner must use some kind of cocking mechanism which produces the recoil action in the gun and thus initiates the loading process.

Cocking devices of this sort are known, and it has been proposed to use a draw cable which projects out of the weapon at wire end, this cable being provided with a pulling handle by means of which the cocking mechanism can be operated (see U.S. Patent No. 2,386,801). It has also been proposed to use a cocking device in which, similarly, a draw cable projects from one end of the weapon, this cable being equipped with a telescoping handle by which the device can be cocked (see U.S. Patent No. 2,431,079). It has also been suggested to use a cocking device in which, once again, a draw cable projects from one end of the weapon, the cable being guided over a drum which is driven by an electric motor (see U.S. Patent No. 2,397,507). Also known is a cocking device equipped with a toothed rack driven by an electric motor which is controlled from a desired remoteposition, the device being caged through the medium of the rack (see U.S. Patent No. 2,411,954).

The present invention relates to a hydraulically operating cocking device. Hydraulic cocking devices are more reliable in operation and simpler in construction, than electrically operating devices and they can be more accurately controlled than manual, purely mechanically operated cocking devices. The use of hydraulically operating cocking devices, however, involves the difficulty, or so it has seemed hitherto, that either twice the travel of the cocking device had to be provided for, or a reduction gear had to be provided after the hydraulic cylinder accommodating a drive piston.

It is one object of the present invention to provide a hydraulic cocking device for automatic fire arms, which requires neither the double stroke length of the hydraulic cylinder, nor a reduction gear, but which rather involves a substantially shorter longitudinal travel coupled with a simple construction involving only few separate components. The cocking device is intended to be capable of easy attachment to automatic fire arms of different designs, without the necessity of major structural changes to the fire arm.

It is another object of the present invention to provide a cocking device for automatic fire arms, wherein the member through which movement is imparted to the breech, is carried on an actuator guided for movement in a direction parallel to the direction of movement of the breech, the actuator being mechanically attached to a piston which is displaceable in double-acting fashion in a hydraulic cylinder disposed parallel to the axis along which the actuator is guided.

The cocking device in accordance with the present invention has the advantage of compactness and is space-saving along the longitudinal direction of the fire arm. Moreover, the cocking device is simple, reliable in operation and capable of accurate remote control. Finally, it can also be attached to existing fire arms, without the need for any appreciable amount of conversion work.

It is still another object of the present invention to provide a cocking device for automatic fire arms, wherein, as a connection between the actuator and the piston are arranged wire cables having a smooth external surface, which cables, at points spaced from the ends of the cylinder, in each case pass over a pulley and link together the particular associated ends of the piston and the actuator. The mechanical connection thus takes the form of a "flexible piston rod," the simplest kind. The wire cable, for the purpose of overcoming the sealing problem between itself and the end wall of the hydraulic cylinder, is provided with a jacket, made of synthetic material or of rubber, which is either glued to the wire over its full length or is preferably rigidly connected with the wire by injection-molding, casting or some other suitable process.

The securing between the flexible piston rod, the piston and the actuator can basically be effected in any desired manner. Preferably, however, the ends of each wire cable is passed through a centrally bored-out screw and then fitted with a soldered nipple, whereafter the respective screws will be screwed into tapped holes in the piston and the actuator. At least in the actuator, the wire cables will be attached in a longitudinally adjustable manner, in order that manufacturing and assembly tolerances can be taken up.

Each pulley will preferably be arranged upon a lug through which the complete cocking device is attached to the cradle of the gun. Because the securing element performs at the same time the function of supporting the pulley, a cocking device embodying the invention is further simplified, as compared with existing devices.

It is yet another object of the present invention to provide a cocking device for automatic fire arms, wherein the cylinder, which contains the piston for the actuator, is preferably mounted on the base which carries the actuator. The guide for the actuator, and the cylinder, then constitute a structural unit. However, the cylinder need not necessarily form one unit with the base element, but can instead be attached to this element at an angle to the actuator guide should the detail design of the automatic fire arm require it. In such an instance, further pulleys for direction changes of the wire cable would have to be provided.

The problem of sealing between the flexible piston rod and the end walls of the cylinder is overcome in accordance with a further embodiment of the present invention,
by virtue of the fact, that the seal is constituted by polished draw rings and possibly additional sealing rings.

With these and other objects in view, which will become apparent in the following detailed description, the present invention will be clearly understood in connection with the accompanying drawings, in which:

FIGURE 1 is a fragmentary side elevation of the breech of a cocking device embodying the present invention;

FIG. 2 is a section along the lines 2—2 of FIG. 1;

FIG. 3 is a side elevation, rotated through 90° with respect to the section of FIG. 1, of the drive section of the breech, the front wall being partially broken away;

FIG. 4 is a section along the lines 4—4 of FIG. 3;

FIG. 5 is an axial section through one end of the hydraulic cylinder; and

FIG. 6 is an axial section through one end of the piston, referring now to the drawings, the device designed in accordance with the present invention comprises a cradle 1 which supports the cocking device. The cradle 1 contains guides 2 for a fire arm housing 3, in which a breech block 4 is axially movable. The fire arm housing 3 contains axial slots 5 in which cocking dogs 6, connected with the breech 4, slide. The cocking dogs 6 act as stops for a dog 8 carried on an actuator 7. The dog 8 slides in the same axial slot 5 as the dog 6, it also slides in an axial slot 9 formed in a base element 10 of the cocking device.

The base element 10 of the cocking device is arranged in the cradle 1 and is located to one side, between the cradle 1 and the gun housing 3. The base element 10 has a substantially rectangular cross-section. On one side of it, a hydraulic cylinder 12 is mounted by means of two clamps 11. A piston 13 is reciprocable in the hydraulic cylinder 12. The clamps 11 fix the cylinder 12 to the base element 10 and at the same time constrain it against axial displacement. At the ends of the base element 10, a lug 14 is welded in place. Each lug 14 contains holes through which screws 15 are inserted and these fasten the base element 10, together with the hydraulic cylinder 12, to the cradle 1. Each lug 14 carries on that of its sides remote from the cradle 1, a spindle for a pulley 16.

The actuator 7 and the piston 13 are linked with one another by a wire cable 17 provided with a sheath of synthetic material or rubber. The sheath or jacket 20 is either glued to the wire cable over its entire length or, and this is the preferred arrangement, is formed around it by injection-molding, casting or other suitable process. The wire cable 17 is divided into two lengths. Each length passes from one end of the actuator 7 over the associated guide pulley 16 through a seal 18 in the cylinder 12, to the associated side of the piston 13.

The attachment of the wire cable 17 to the ends will conveniently be effected in the manner illustrated in FIG. 6. In this arrangement, a screw bolt 19 bored out along its axis is provided, and the wire cable 17 is initially inserted through this bore. At this stage, a soldered head 21 is secured to the end of the wire cable 17 and the screw bolt 19 finally screwed into a tapped threaded hole in the end of the associated component.

The piston itself is provided around its external periphery in conventional manner with piston rings 22.

The securing to the actuator 7 can be effected in a similar way. Advantageously, at least one securing means, namely that to the actuator, will be so contrived that longitudinal adjustment of the wire cable 17 is possible, so that manufacturing and assembling tolerances can be adjusted. This can be brought about by inserting the screw bolts to a greater or lesser extent.

The type of sealing chosen at the end side of the hydraulic cylinder 12 between cylinder end and wire cable is illustrated in detail in FIG. 5. The seal between the wire cable 17 and the end wall of the cylinder 13 is assured by means of two polished draw rings 24, provided at entry- and exit-ends of the wire cable 17 and equipped, if required, with circumferential sealing rings 25. The end wall itself comprises an externally fitted screw cylinder 75.
corresponding end of said wire cables to said actuator and said piston, respectively.
7. The cocking device, as set forth in claim 6, which includes means for adjusting the operative length of said wire cables in order to adjust to manufacturing and assembling tolerances.

References Cited

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