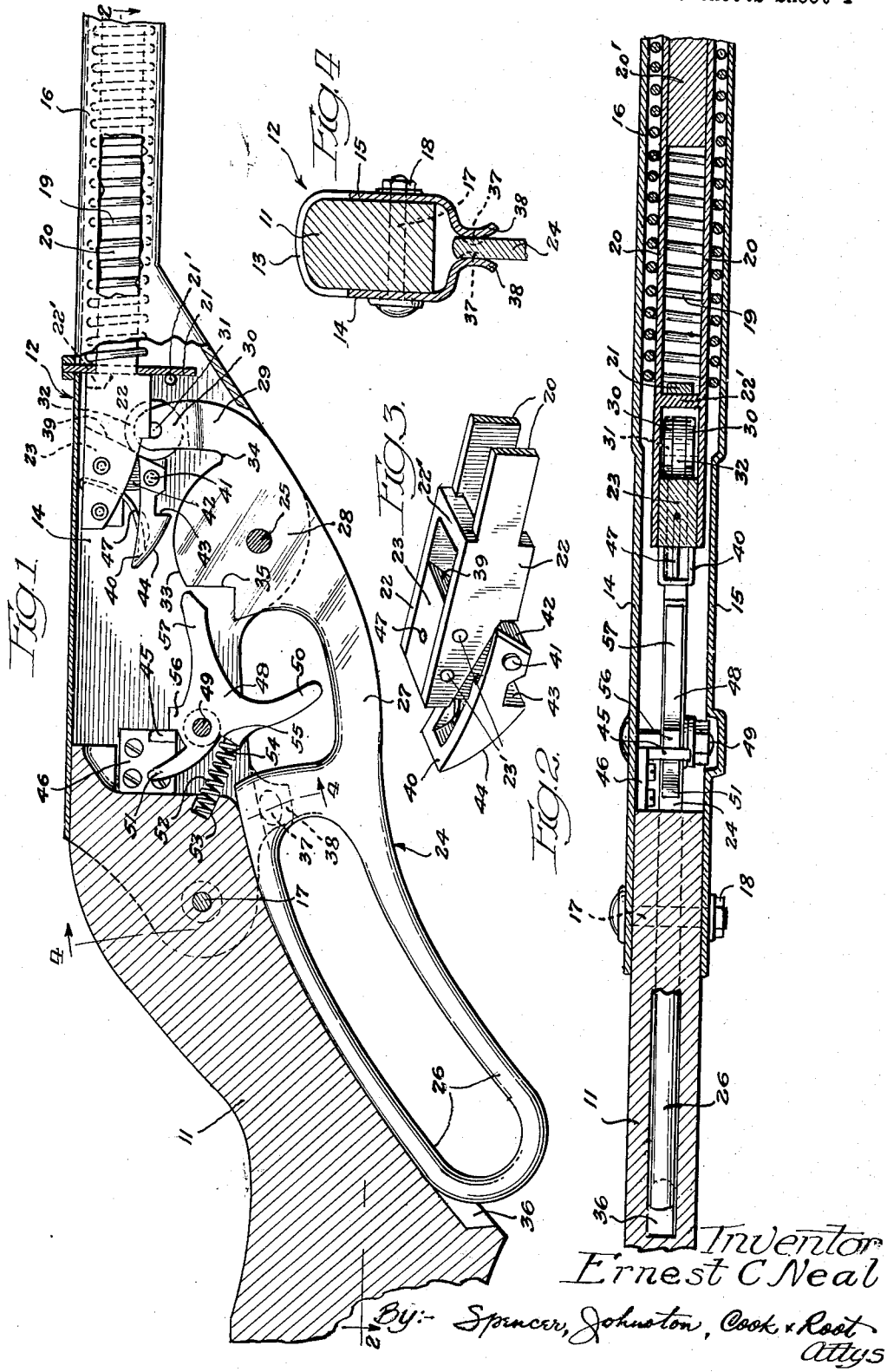
Aug. 3, 1954 E. C. NEAL 2,685,284

SPRING COCKING AND TRIGGERING MECHANISM

Filed July 12, 1950 3 Sheets-Sheet 1



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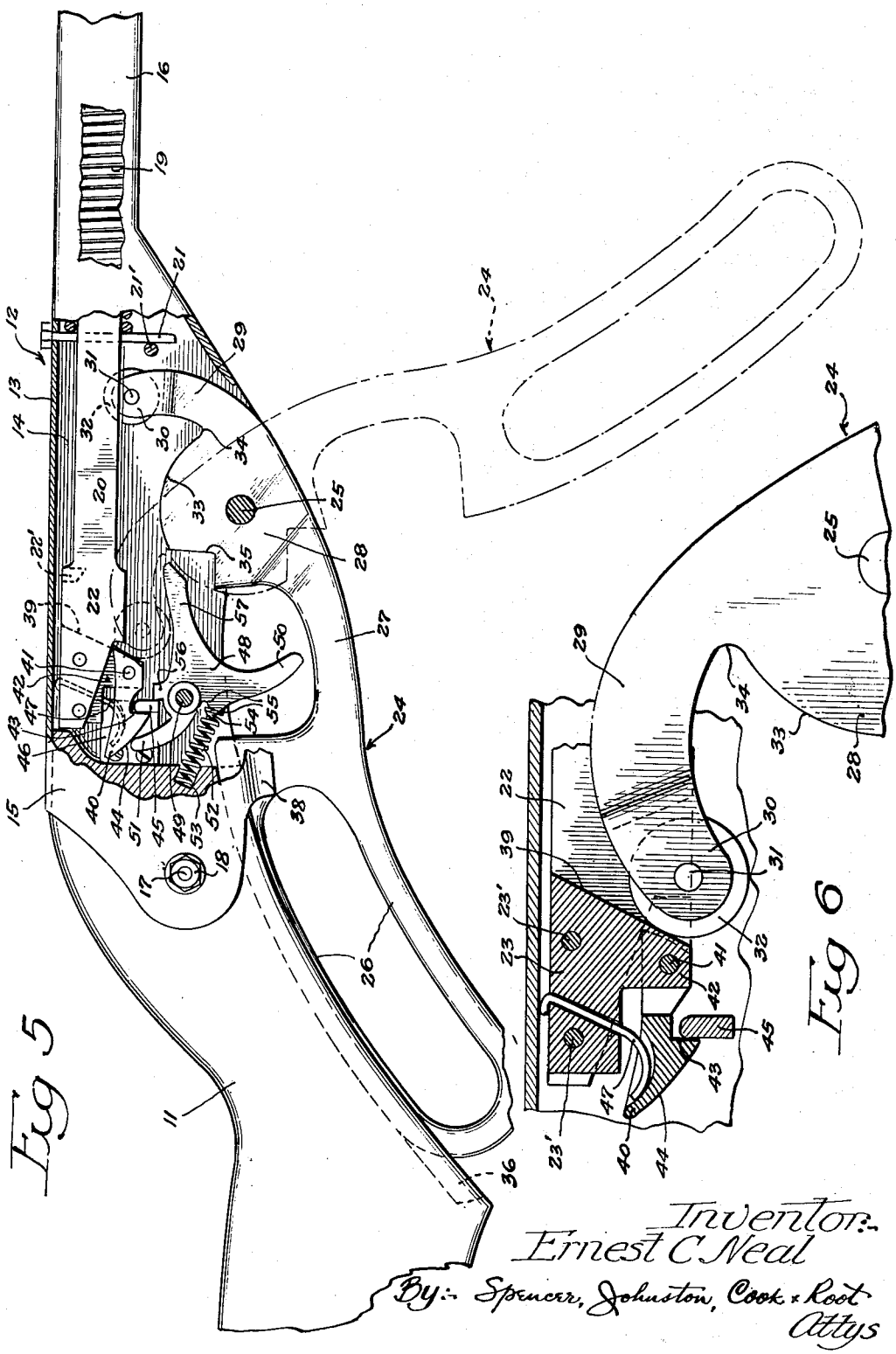


Fig 5

Fig 6

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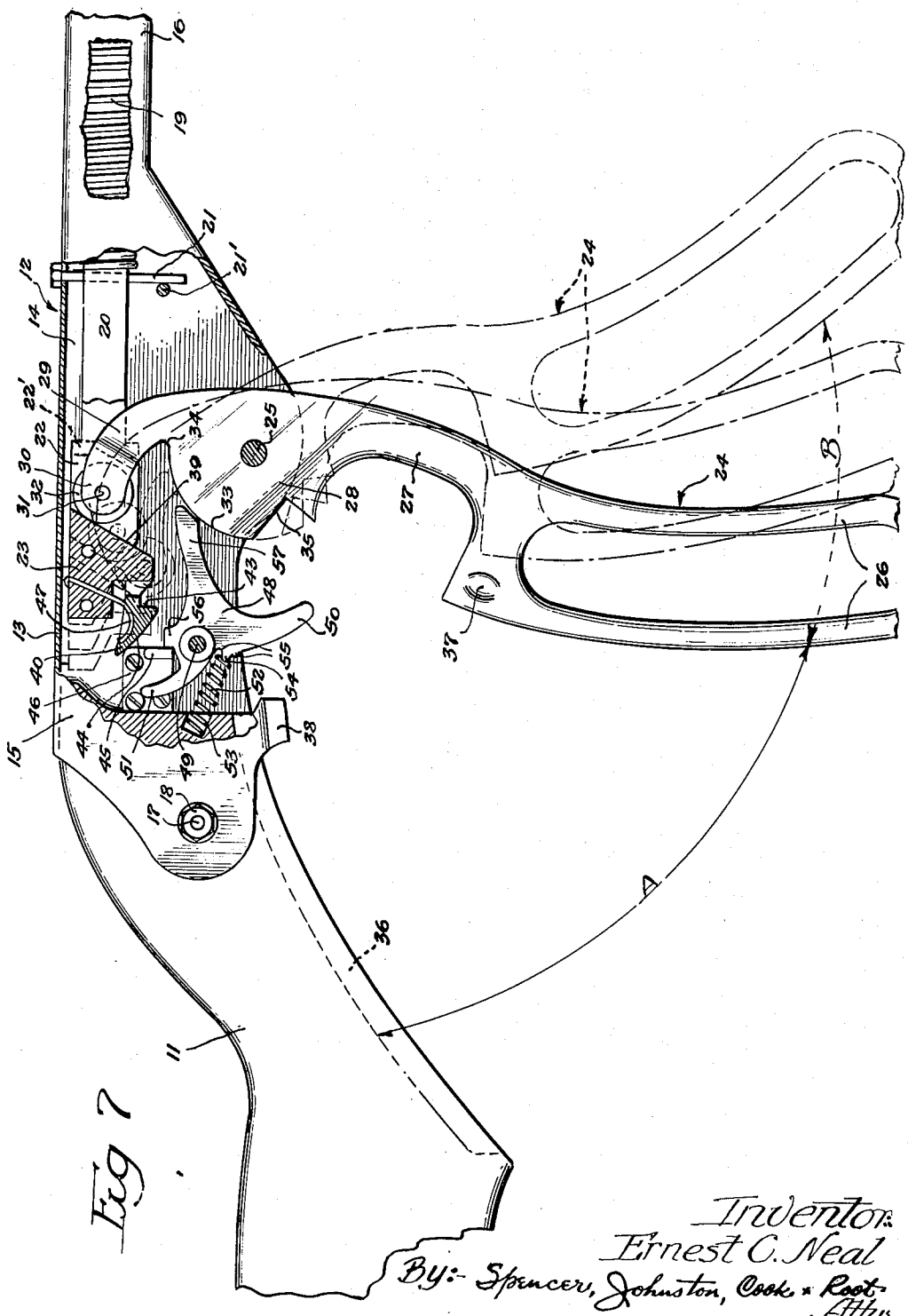


Fig 7.

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SPRING COCKING AND TRIGGERING MECHANISM

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1 Claim. (Cl. 124—15)

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The present invention relates in general to air pressure actuated devices, such as air rifles, and has more particular reference to pneumatic devices having a cocking lever and a spring actuated piston for developing air pressure for the operation of the device.

A defect inherent in conventional lever cocked spring actuated piston mechanisms arises from the necessity of employing a relatively stiff actuating spring requiring the expenditure of considerable effort in cocking the mechanism against the contrary pressure of the actuating spring. Air rifles of the sort commonly provided for use by youngsters require considerable force to cock the gun, in fact, the cocking force required in many conventional air rifles is beyond the powers of some children.

Conventional lever actuated air rifles also afford a hazard in that inadvertent release of the mechanism by trigger action, after the spring has been cocked and before the cocking lever has been returned to normal standby position against the stock of the gun, will result in driving the cocking lever, by action of the released spring, toward its normal standby position, thereby subjecting the arm, hand or finger of the operator to the danger of injury if caught between the stock and the backwardly driven cocking lever. Since the spring is of relatively powerful character, serious injury may result to the limb of an operator as the result of inadvertent release of the cocked spring before return of the cocking lever to standby position.

An important object of the present invention is to provide improved cocking mechanism for air rifles and the like, which will permit the mechanism to be cocked with relative ease.

Another important object is to provide trigger releasable mechanism of the character mentioned having means to prevent releasing operation of the trigger whenever the actuating lever is in other than its standby position.

Another important object of the invention is to provide cocking mechanism embodying a lever having a roller adapted to operate upon a cam in wedging fashion whereby the mechanism may be cocked with relative ease; a further object being to provide cocking mechanism whereby a toggle or crank effect is obtained at the end of the cocking stroke, thereby increasing the leverage of the cocking mechanism as the spring comes under maximum tension.

A still further object of the invention is to provide automatically operating safety means for and air rifle or similar spring actuated mechanism whereby the operation of a mechanism releasing trigger may be prevented whenever the spring cocking lever is in other than its normal standby position, to thereby make it impossible to injure the arm, hands or fingers of the operator by inadvertent trigger release during the spring cocking operation.

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The foregoing and numerous other important objects, advantages, and inherent functions of the invention will become apparent as the same is more fully understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment of the invention.

Referring to the drawings:

Fig. 1 is a fragmentary sectional view through an air rifle embodying the present invention;

Fig. 2 is a sectional view taken substantially along the line 2—2 in Fig. 1;

Fig. 3 is a perspective view showing parts of the mechanism illustrated in Figs. 1 and 2;

Fig. 4 is a sectional view taken substantially along the line 4—4 in Fig. 1;

Fig. 5 is a fragmentary perspective view of the air rifle, with parts thereof sectionalized, showing the mechanism in cocked position;

Fig. 6 is an enlarged sectional view showing portions of the mechanism at the conclusion of the cocking stroke; and

Fig. 7 is a fragmentary perspective view of the air rifle with parts thereof sectionalized, and illustrating the relative position of the mechanism parts during intermediate stages of the cocking operation.

To illustrate the invention the drawings show an air rifle comprising a stock 11, of any suitable or preferred configuration, carrying a hollow fame 12, preferably comprising a formed sheet metal shell. The shell may be formed by suitably bending a metal sheet or plate to provide a curved top wall 13, and a pair of spaced, preferably parallel side walls 14 and 15. A preferably cylindrical false barrel 16 may be mounted on the frame 12 in position projecting therefrom at the stock remote end of the frame. If desired, the false barrel 16 may comprise an integral frame extension, the frame and false barrel being preferably formed from a single metal plate. The frame 12 may be secured to the stock in any suitable fashion as by means of a bolt 17 extending through the stock and through both of the side walls 14 and 15 of the frame, said bolt having threaded engagement with a clamping nut 18.

The frame 12 and false barrel may carry an

air plunger or piston (not shown) of any suitable or conventional construction, which is adapted to be forced forwardly in the false barrel by sudden expansion of a compression spring 19, in order thus to expel a shot through a true barrel (not shown) mounted and supported within the false barrel. The spring is preferably of helical configuration and may be mounted within the false barrel at the frame connected end thereof. The air plunger or piston may be connected to the forward end of an actuating structure preferably comprising spaced parallel piston rods or bars 20 interconnected in spaced relationship, as by means of a spacing block 20'. The spring 19 is preferably interposed between the air piston and an abutment member 21, which may comprise a bar or plate mounted on the top wall 13 of the frame 12 in position extending across the frame connected end of the false barrel. The lower portions of the bar 21 may rest against a transverse support pin 21' mounted at its ends on the side plates 14 and 15. The abutment bar 21 preferably extends between the bars 20, which, in turn, extend in the false barrel and within the helical spring 19. The bars 20 also extend within the frame 12 and are formed with enlarged head portions 22 at their ends. These head portions may be spaced by a transverse spacing member 22', which also may serve as a stop adapted to engage the member 21 to limit movement of the bar structure and connected piston under the influence of the spring 19.

A cam block 23 is mounted between the enlarged portions 22 of the bars, as by means of rivets 23'. By means of the cam block, the headed ends of the bars 20 may be retracted within the frame 12, away from the abutment member 21, and the spring thus may be compressed between the piston and the abutment member 21 in order to cock the device for action. Suitable means is provided for latching the headed ends of the bars in retracted or cocked position, and for releasing the same, at will, in order to protect the bars 20 and the connected piston under the influence of the compressed spring.

Means for cocking the mechanism may comprise a cocking lever 24, pivoted on a pin 25 which, in turn, is mounted at its opposite ends on the side panels 14 and 15 in position extending therebetween. The cocking lever may comprise a portion forming a handle 26, by means of which the same may be turned on the said pivot pin 25. Between the pivot pin 25 and the handle portion 26, the cocking lever may be formed with a trigger guard portion 27, forming a cavity for receiving the mechanism release trigger, when the lever is in its inactive or standby position, shown in Figs. 1 and 5. The trigger guard portion 27 is integrally connected with a hub 28 formed with an opening for receiving the pin 25; and said hub, on the side thereof remote from said trigger guard and handle portion of the lever, may be formed with an integrally upwardly curved extension 29 extending within the housing 12. The extremity of the extension 29 is preferably bifurcated to provide a pair of spaced arms 30 on and between which may be mounted a pin 31 carrying a driving roller 32 turnably supported on the pin between the arms 30. The hub 28 is preferably provided with a curved cam surface 33 extending from and making an angle or notch 34 with the extension 29 at one end of said cam surface. At the opposite end of the cam surface the hub 28 is formed with a notch 35.

The stock 11, in its lower edge, is preferably formed with a longitudinally extending and downwardly opening notch or slot 36, forming a seat in position to receive the edge of the handle portion 26 of the lever when the same is in its normal or standby position, as illustrated in Figs. 1 and 5. A pair of notches or dents 37 may be formed in the opposite sides of the handle 26 in position to be latchingly received between latching flanges 38 comprising extensions of the side walls 14 and 15 of the housing 12. These latching flanges are adapted to snap into latching engagement in the dents 37 when the lever is in its normal or standby position in the seat 36.

The block 23, which interconnects the enlarged ends 22, of the bars 20, is provided with a forwardly facing downwardly inclined surface 39 upon which the roller 32 may roll when the cocking lever 24 is moved in its cocking stroke away from its seat 36, in a counterclockwise direction, viewing Figs. 1, 5 and 7 of the drawings. The inclined surface 39 of the spacing block 23, is disposed at an angle such that the roller 32, during the initial movement A of the cocking lever in a direction away from standby position, will move upwardly along the surface 39 and apply thrust upon the block in a direction substantially normal to the plane 39, such direction being at an angle with respect to the direction of spring compressing movement of the bars 20. During the medial portions of the cocking stroke, shown in solid lines in Fig. 7, the roller 32 will have reached the upper portion of the surface 39. Thereafter, during the concluding portions B of the cocking stroke of the lever, the roller will ride downwardly on the surface 39 in the manner indicated in dotted lines in Fig. 7, thereby applying progressively increasing leverage, through which thrust is applied upon the block 23, by virtue of the toggling action of the roller as it approaches a terminal position disposed directly between the lower end of the block and the pivot pin 25. The wedging action thus accomplished during the terminal portion of the cocking stroke of the lever, increases the leverage of the mechanism and thus relatively reduces the force which must be applied upon the handle 26 as the spring reaches a condition of maximum tension, thus rendering the cocking action easy. By thus providing increased leverage upon the block during the terminal portions of the cocking stroke, the lever 24 is caused to exert a rapidly increasing force upon the block 23 as the lever completes its cocking stroke. This increasing force more than compensates for the progressively increasing reaction of the spring and permits the operator of the mechanism to exert substantially uniform effort during the cocking stroke of the lever. Conventional rifles having a cocking lever and a spring actuated piston require the operator to exert a maximum cocking effort upon the lever toward the end of its cocking movement. By actual test it has been found that an air rifle, constructed as herein described, requires a maximum cocking effort less than half as great as that required in cocking a conventional air rifle containing a comparable spring, such maximum effort occurring during intermediate portions of the cocking movement of the lever and falling off during the latter portions of the cocking stroke by virtue of the wedging action of the roller 32 upon the inclined cam surface 39.

The block 23 and attached bars 20, also the connected air plunger or piston, as a unit, is adapted to be retained in retracted or cocked

position by means of a sear 40 comprising a latch pivotally mounted on the outer ends of a pin 41 which extends through an opening in a dependent portion 42 of the block 23 adjacent the lower end of the cam surface 39. The sear 40 has a downwardly opening notch 43 and an adjacent upwardly inclined surface 44. As the mechanism approaches cocked position, as a result of the operation of the lever 24, the inclined surface 44 of the sear comes into engagement with and rides upon the upper edge of a latching lug 45 which may be carried on a bracket 46 secured within the housing 12, as on a side plate 14 thereof. The sear is pivoted upwardly as a result of this action until the notch 43 is in alignment with the lug 45, whereupon the sear may latchingly engage the lug in the notch 43 to retain the mechanism in cocked position. A spring member 47 secured at one end in the block 23 and pressing at its other end upon the sear normally urges the sear on its pivot 41 in a direction to latch with the lug 45, until the sear is moved against the influence of the spring 47 in order to release the cocked mechanism.

Means is provided for releasing the sear from the lug 45, the same comprising a trigger element 48 pivotally mounted for rocking movement on a pin 49 which is mounted on the side of the housing. This trigger element has an arm or finger piece 50, which projects downwardly of the housing into the guard opening of the lever 24 when the same is in normal or standby position. The trigger element 48 also has a finger or lug 51 for engaging and releasing the sear from the latch lug 45. The trigger element is normally urged by means of a spring 52, in a counter clockwise direction on the pivot pin 49, by viewing Figs. 1, 5 and 7, to normally retract the finger 51 from engagement with the sear. To this end the spring 52 may be mounted in a socket 53, formed in the stock 11 in position opening within the housing 12 toward the trigger element 48. The opposite end of the spring may be seated upon a lug 54, formed on the trigger element, and bears on adjacent shoulders 55, to normally urge the trigger element in the desired direction. The trigger element 48 is also preferably formed with an outstanding lug 56 in position to engage the latch lug 45 in order to limit the movement of the trigger element under the influence of its biasing spring 54. By pressing upon the finger piece 50, however, the trigger element may be turned against the influence of the spring 52 to press the sear releasing finger 51 against the surface 44 of the sear and thereby release the same from engagement with the lug 45 against the influence of the spring 47.

An important feature of the present device prevents actuation of the trigger element 48 for the release of the sear from the latch lug 45 at all times except when the cocking lever 24 is in its retracted or standby position folded against the stock 11 in the seat 36. To this end the trigger element 48 is provided with a projecting finger 57 having an end formed to bear and ride upon the curved cam surface 33 of the lever, whenever the same is shifted from its normal or standby position, thereby preventing rotation of the trigger element in sear releasing direction so long as the finger 57 is in engagement with the cam surface 33. As the lever 24 reaches the limit of its cocking stroke the nose of the finger 57 may enter the notch 34 to serve as a stop for limiting further

movement of the lever 24. The finger 57, however, will remain in engagement with the surface 33 until the lever has been returned to its normal or standby position, seated in the slot 36. When so positioned the end of the finger 57 is in registration with the notch 35 and is released from the locking surface 33. Accordingly, the so released element 48 may be moved for the performance of its sear releasing function, the end of the finger 57 moving into the notch 35 to allow sear releasing operation of the trigger element. As a consequence the trigger cannot be actuated inadvertently, accidentally or otherwise, to release the sear until after the lever 24 has been returned to a safe standby position, following the completion of its cocking stroke.

It is thought that the invention and its numerous attendant advantages will be fully understood from the foregoing description, and it is obvious that numerous changes may be made in the form, construction and arrangement of the several parts without departing from the spirit or scope of the invention, or sacrificing any of its attendant advantages, the form herein disclosed being a preferred embodiment for the purpose of illustrating the invention.

The invention is hereby claimed as follows:

An air gun comprising means forming a stock, a housing on said stock, a tubular barrel on and extending outwardly of said housing, a work member comprising a pair of spaced apart parallel bars having portions extending within said barrel and ends disposed in said housing, a cam block secured to and extending between the said ends of said bars within the housing, said block being formed with an inclined cam surface between said bars and facing toward the barrel enclosed portions thereof, helical spring means encircling said bar portions within the barrel for projecting the work member longitudinally in one direction from retracted to projected position in said housing and barrel, a lever pivoted on said housing and having an operating handle formed normally to extend in retracted position snugly against the stock, a roller pivoted on the lever in position for rolling engagement with the cam surface of said block whereby to move the work member against said spring means from projected to retracted position and thereby cock the same in response to pivotal lever movement away from retracted position, a latch pivotally connected on said cam block, a latch keeper on said housing in position for engagement with said latch when said work member is in cocked position, a trigger movable on the housing to release said latch from said keeper, said trigger having a safety finger and said lever having a safety cam normally disengaged from said safety finger when said lever is in retracted position, said cam engaging said safety finger to lock the trigger against latch releasing movement when said lever is displaced from retracted position in cocking said work member.

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