Aug. 2, 1932. C. C. LOOMIS 1,869,600

AIR GUN

Original Filed Oct. 8, 1927 2 Sheets-Sheet 1

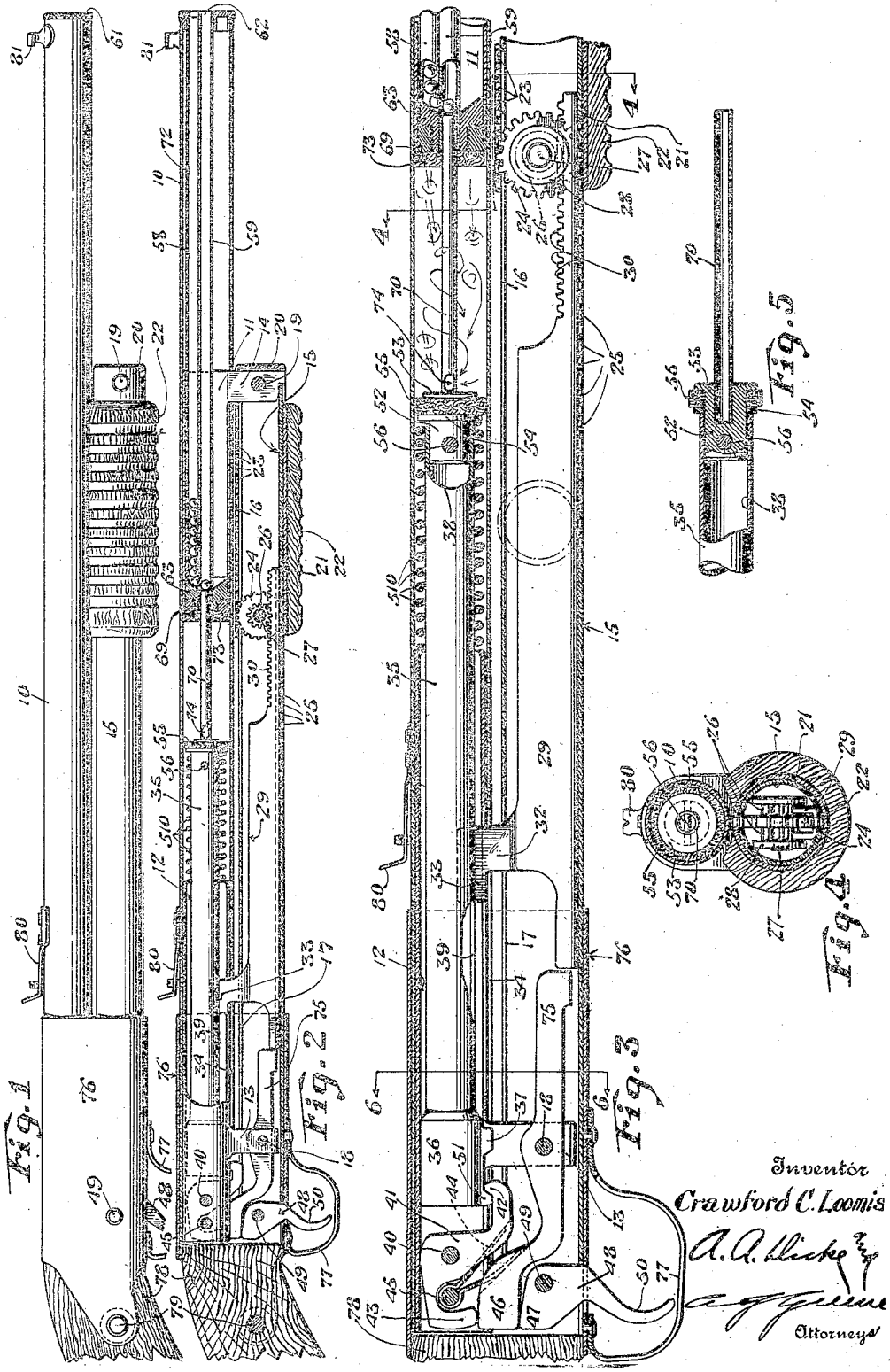

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Inventor
Crawford C. Loomis
A. A. Hicke
Attorneys

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AIR GUN

Original Filed Oct. 8, 1927 2 Sheets-Sheet 2

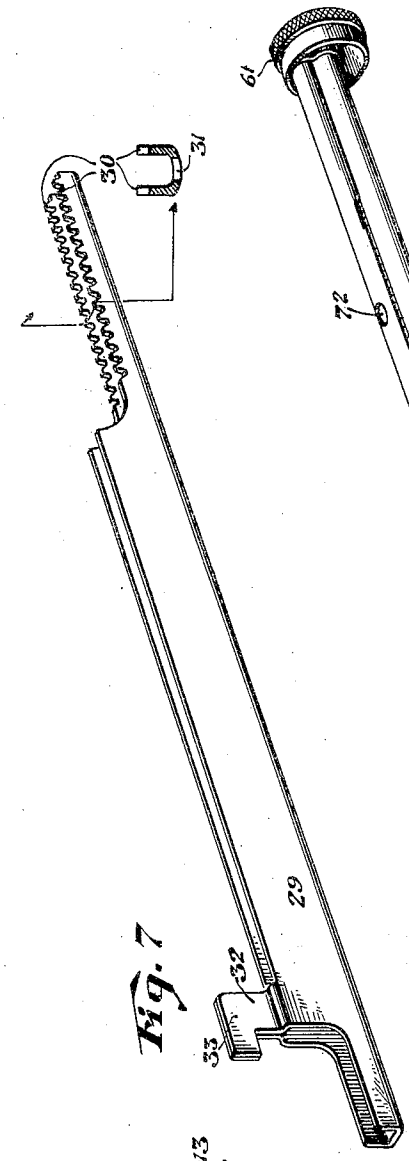

Fig. 7

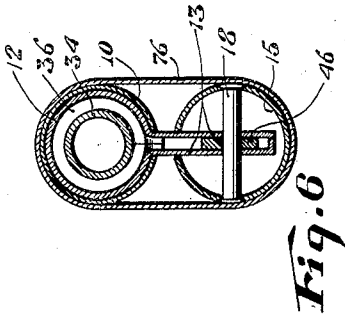

Fig. 6

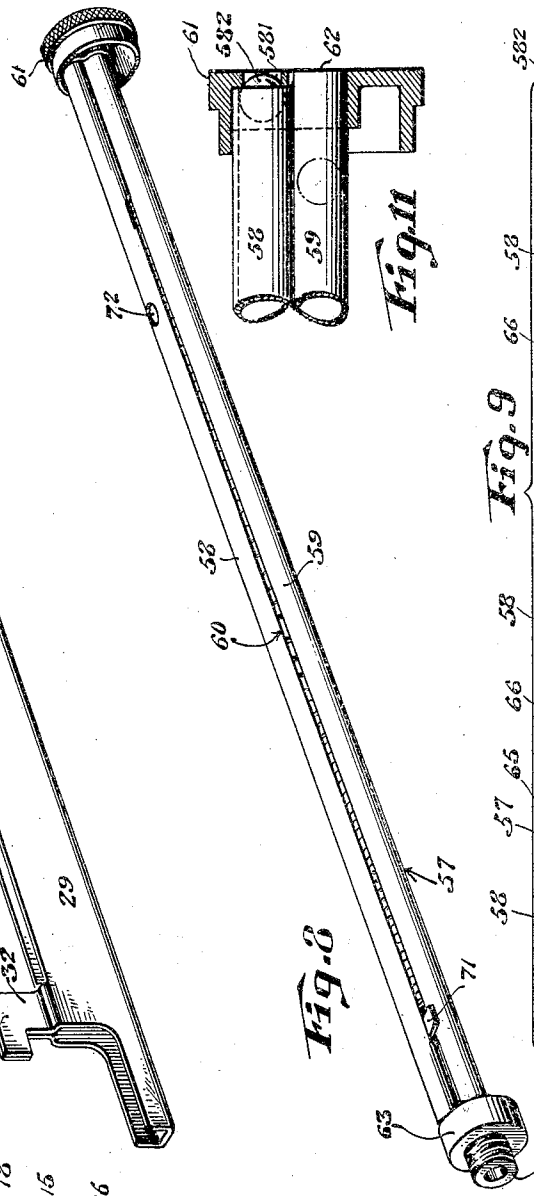

Fig. 8

Fig. 11

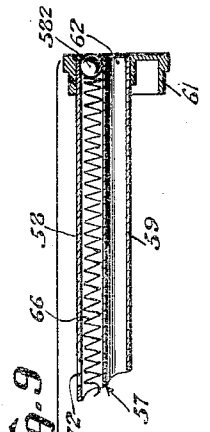

Fig. 9

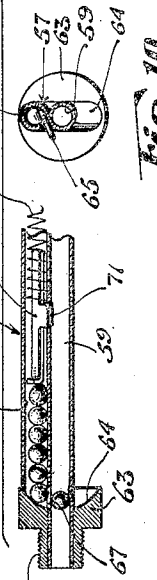

Fig. 10

Inventor
Crawford C. Loomis
A. A. Hicks
Attorneys

By

Patented Aug. 2, 1932 1,869,600

UNITED STATES PATENT OFFICE

CRAWFORD C. LOOMIS, OF ILION, NEW YORK, ASSIGNOR TO REMINGTON ARMS COMPANY, INC., A CORPORATION OF DELAWARE

AIR-GUN

Application filed October 8, 1927, Serial No. 224,888. Renewed June 20, 1931.

This invention relates to improvements in spring-operated air guns, the main object being to produce a simple and durable air gun of improved efficiency, accuracy and appearance.

The present improvements are applied to that type of gun known as a "pump gun" in which the compression of a spring is effected by the sliding of a handle longitudinally and parallel with the barrel.

It is an object of the invention to improve the character of means employed for operating the power storing devices. In the prior art constructions usually this means comprises a series of levers or toggle levers intermediate and interposed between the sliding handle and the member that compresses the spring.

Such parts are objectionable in that when the gun is cocked the clothes or fingers of the juvenile operator may be caught in the protruding parts of the cocking mechanism. This objection also resides in air guns of other classes, such as, the break-down and the lever-actuated type. One of the objects of the present invention is to effectively shield the parts of the cocking mechanism to prevent injury to the operator so that the only moving parts that are accessible are the sliding handle or forearm and trigger.

Another object of the present invention is to provide an improved construction of the cocking mechanism, and more specifically it comprises an intermediate gear and rack mechanism which effects the same movement of the power storing spring as the lever mechanism, and has the marked advantage that it requires less space and is more easily operated and guarded. Gear ratios and spring values have been so chosen as to make the operation easy as well as safe for the juvenile operator.

Another object of the invention is to provide an air gun that will closely simulate a sliding forearm action or "pump" shot gun or rifle both in appearance and operation, and at the same time have an easily operated mechanism.

Another object of the invention is to provide an improved means of assembling the gun so that a rigid structure may be obtained, but still permitting a dismounting of the parts to permit repairs and access for inspection. By means of the present construction the stresses resulting from the firing of the gun are not imposed upon the barrel thus permitting a light sheet metal barrel to be used.

It is also an object of the present invention to improve the type of magazine unit usually employed and to devise one that is simple in construction and inexpensive to manufacture. The result of the improved construction is that the magazine barrel is easily loaded and the successive feeding of the shots insured.

Further improvements reside in a new form of interlock between the cocking and firing mechanism, and among the many advantages may be mentioned the provision of an automatic "safe" which requires no attention on part of the operator to function.

Other objects and advantages of the invention will appear in the following specification which describes the particular embodiment of the invention illustrated in the drawings, in which:

Fig. 1 is a view in side elevation of the gun embodying the present improvements showing the action closed.

Fig. 2 is a longitudinal sectional view of the gun showing the action closed and the gun in condition for a firing operation.

Fig. 3 is a longitudinal sectional view on an enlarged scale of a part of the gun.

Fig. 4 is a cross sectional view of the gun taken on line 4—4 of Fig. 3, the magazine unit being removed to more clearly show other parts.

Fig. 5 is a fragmentary sectional view of one end of the plunger and plunger rod or tube.

Fig. 6 is a cross sectional view taken on the line 6—6 of Fig. 3.

Fig. 7 is a perspective view of the plunger operating rack member.

Fig. 8 is a perspective view of the magazine unit.

Fig. 9 is a fragmentary longitudinal sectional view of the magazine unit.

Fig. 10 is a cross sectional view of the magazine unit.

Fig. 11 is an enlarged fragmentary sectional view of one end of the magazine unit.

The gun comprises a false barrel 10 in which is inserted at the forward end a short tube 11 and these two members are preferably secured together by riveting, welding, brazing or any other fastening means well known in the art. At the rearward end of the barrel 10 is inserted and secured by any desired means a tube 12 similar to the tube 11. The tube 12 is provided with a pair of downwardly extending ears 13 (Figs. 3 and 6), and, similarly, the tube 11 is also provided with a pair of ears 14. An auxiliary housing or action bar housing tube 15 is slotted longitudinally at 16 at its upper and forward portion and is also provided with a similarly formed longitudinal slot 17 at its rearward and upper end to receive the pairs of ears 14 and 13 respectively. The action bar housing 15 is mounted parallel and secured to the false barrel 10 by a cross rivet 18 passing through the rearward end of the housing 15 and ears 13 and by a rivet 19 passing through the forward end of the housing 15 and ears 14. The front part of the housing 15 is closed by a cap 20 which is also secured in place by the rivet 19.

By means of the above described construction, it will be noted that a very rigid structure and framework is obtained. The four points of connection insure rigidity and exact parallelism between the barrel and the housing and take up the stresses imposed upon the framework by successive firing of the gun. The barrel and housing are adapted to contain the operating parts of the gun which will now be described in detail.

Slidably mounted on and preferably surrounding the housing 15 is a sleeve 21 which carries the forearm operating member 22 which is grooved and so formed as to simulate the appearance of the forearm of powder ammunition guns. The upper periphery of the sleeve 21 is formed with a series of perforations 23 to receive the teeth of a floating gear 24 which also meshes with similarly formed perforations 25 formed in the housing 15. Passing through the center of the gear 24 is a broad faced gear 26 (Fig. 4). The gear 24 is preferably blanked centrally to receive the gear 26 with a forced fit and is placed centrally of the gear 26, which gear thus in effect presents two sets of teeth on opposite sides of gear 24. A headed rivet 27 passes through a hole in the gear 24 and holds a washer 28 at each side of gear 26. The result of the above construction is that the gear unit is confined laterally within the housing 15 so that the gear unit will always rotate in the same plane.

Mounted within the housing 15 is action bar 29 which consists of a channel-shaped rack member formed with teeth 30 at its forward end. There are two sets of teeth 30 and they are adapted to mesh with the gear 26 on opposite sides of the gear 24 as best shown in Fig. 4. The base of the rack member 29 is slotted at 31 (Fig. 7) to receive the larger gear 24. The upper rearward portion of the rack member 29 is contracted at 32 so that a head 33 projects thru the slot 17 in the housing 15 as well as a longitudinal slot 34 formed in the lower part of the false barrel 10. It will be observed that the base of the rack member 29 is formed concentric with respect to the tube 15 so that it may fit closely to the latter (see Fig. 4). Slidable in the tube 12 is a piston rod 35 the rear head 36 having a lug 37 aligned with the head 33 of the rack member 29. Forward of the rear head 36 is an integral tube 38 the lower periphery being slotted longitudinally at 39 to receive the projecting head 33. The folded portion of the rack member below the confined portion 32 is slightly larger than the slot 17 so as to prevent any upward movement of the rack member while it is being reciprocated. By the above construction, it will be obvious that the rack member is confined at both ends.

Pivoted on a cross pin 40 carried by the tube 12 and false barrel 10 is a sear member 41 having a forward catch finger 42 and a curved finger 43. A combined sear and trigger spring 44 is carried by a cross pin 45 and partially encircles the same so that one end thereof engages a slot formed in the sear member 41 and the other end engages a slot formed in the rearward arm 46 of a double arm locking member which is pivoted by the pin 18 between the ears 13 which are spaced apart as will be seen in Fig. 6. The arm 46 is intermediate the finger 43 and an actuating extension 47 of a trigger 48. The trigger is pivotally mounted on a removable screw pin 49 and below the pin 49 is the customary finger lever 50 of the trigger. Rearward of the lug 37 is an adjacent lug 51 which is adapted to engage the catch finger 42 of the sear member 41.

When the gun is cocked the piston rod will occupy the position shown in Figs. 2 and 3 at which time it will be observed that the lug 51 will be engaged by the catch finger 42. When the gun is fired the released piston will occupy its forward position thereby placing the lug 37 adjacent the abutting portion 33 of the rack member 29. Assuming that the gun has been fired and that the piston occupies its forward position and it is desired to cock the gun the operation of the parts above is as follows:

When the forearm 22 is grasped and drawn rearwardly the rack portion 23 will rotate the gear 24 in a counter-clockwise direction and it will be clear that if the pivot of the gear unit were stationary with respect to the

rack position 23 that the gear 24 would, in its counter-clockwise rotation, drive the rack member 29 forwardly or to the right. However, in the present construction the pivot of the gear unit is a floating pivot and since the gear 24 meshes with the rack portion 25 which is stationary with respect to the rack portion 23 and the pivot 27 of the gear unit, the gear unit will roll backwardly and at the full extent of the rearward movement of the forearm 22 the gear unit will occupy the dotted line position shown in Fig. 3 and its movement in a straight line is in the present construction substantially one-half of the total rearward movement of the forearm.

Since the teeth of the gear 24 mesh with the stationary rack portion 25 the point of engagement will be the fulcrum point of the gear unit, so that as the rack portion 23 rotates the gear unit the pivot of the gear unit will move rearwardly. The teeth of the pinion 26 however mesh with the teeth of the driving rack member 29, and as the center of the gear unit shifts from point to point rearwardly the rack 29 will also be moved. The net result of this construction is that the rack member 29 is driven rearwardly at a rate determined by the ratio of the radii of the gears 24 and 26. In the present disclosure a ratio of movement of 3½ to 1 between the forearm member 22 and the rack member 29 is provided. This, according to the present disclosure, permits of an easy cocking action and by varying the ratio between the gears 24 and 26 any desired cocking action may be obtained.

As the rack member 29 moves rearwardly the projection 33 will also slide in the same direction guided by the slot 34 in the false barrel 10 and when it contacts with the lug 37 it will draw the piston rod rearwardly and when the lug 51 strikes the catch finger 42 it will rock the sear 41. When the lug 51 has passed beyond the catch finger it will permit the latter to spring back upwardly so as to engage the lug 51 and hold the piston rod 35 in rearward or cocked position permitting the forearm 22 to be returned to its normal position.

A compression spring 510 is enclosed by the false barrel 10 and is inserted between the forward end of the tube 12 and a plunger 52 carried by the piston rod 35. The plunger 52 (Fig. 5) is headed at 53 and interposed between the head and a perforated disk 54 is a washer 55 made of any suitable material such as soft leather. A cross pin 56 secures the plunger 52 to the piston rod 35. From the above, it will be noted that when the gun is cocked energy is stored up in the spring 510. The release of this energy is utilized to project the shot from the barrel. To provide for the feeding of the shot to the barrel the following mechanism is employed.

The magazine is indicated in Fig. 8 generally by the reference character 57 and comprises as shown in Fig. 8, two barrels, a magazine barrel 58 and a shooting or true barrel 59 which are formed by bending a sheet of metal into an S-shape, (see Fig. 10) suitable metal being cut away to form a longitudinal slot 60 (Fig. 8) for a purpose to be described hereinafter. The ends of the tubes 58 and 59 are securely attached to an end cap 61 which engages the forward end of the false barrel 10. The end cap is apertured at 62 (Figs. 2 and 9) to register with a hole in the end of the true barrel 59. The other end of the magazine unit is attached to a threaded abutment 63 and is formed with a dished slot 64 (Figs. 9 and 10) in immediate contact with the end of the magazine barrel 58. A follower 65 is urged by a spring 66 so as to place the column of shot under compression and in order to permit the passage of the shot from the magazine to the shooting barrel 59 successively a feeding hole 67 is provided (see Fig. 9). The abutment 63 is provided with a screw threaded nipple 68 for engaging a corresponding threaded socket in an abutment plug 69 (Fig. 3) which fits partly within the tube 11 so that the head of the plug engages the end of the tube 11. It will also be observed that the magazine cap 61 fits within the false barrel 10 and holds the shooting barrel 59 concentric therewith so that a starting rod or tube 70 carried by the plunger may register with the shooting barrel 59.

The follower 65 has a laterally extending lug 71 projecting out through the slot 60 to form an actuating handle for retracting the follower. In order to load the magazine the follower 65 may be drawn forward by the handle 71 to compress the spring 66 until an aperture 72 in the magazine barrel 58 is uncovered permitting filling the channel with the shot. The follower is then released after which the spring 66 will place a slight tension thereon which will cause the forward feeding of the shot column after each shot is fired. After a shot is fired the next one to be ejected will be forced through the feeding opening 67 and is effected by the guidance of the concave portion 64 of the abutment 63 thus facilitating the transfers of the shot from the magazine to the shooting barrel.

The mechanism by which the power spring effects the expulsion from the barrel of the shot delivered therein is as follows:

The soft washer 55 on the plunger 52 and a thick yielding washer 73 fixed to the abutment plug 69 on the forward tube 11, with the wall of the false barrel 10, define an air compression chamber. The tube 70 fixed to the plunger 52, passes thru aligned apertures in washer 73, and nipple 68, and terminates (the gun being cocked) adjacent the shot or pellet in the barrel. An aperture

74 in the tube 70 admits air from the compression chamber to the tube in firing and from the tube to the chamber in cocking. The soft washers fit snugly against the wall of the false barrel 10 and the tube 70, insuring a tight chamber. When the tube 35 is released from the holding sear 41, plunger 52 moves quickly forward, compressing the air in the chamber, and a strong blast of air passes thru aperture 74 and tube 70 is directed against the shot in barrel, which is thus forcefully propelled forward. Air leakage around the tube 70 and thru the magazine is minimized or eliminated by a close fit between the tube and the barrel 59. The shock of the collision of the plunger head 52 is cushioned by the thick yielding washer 73. After each operation the magazine spring 66 will automatically feed the column of shot rearward so that another one is always in the shooting barrel 59 in readiness to be shot.

In the construction of the magazine barrels of this type as hitherto carried out, assembly has been a difficult and time consuming operation. To facilitate the operation of assembly the following construction is preferably employed. The magazine barrel does not project entirely thru the end cap 61 but registers with an aperture 581 (Fig. 11) which may be slightly smaller in diameter than the diameter of the follower spring. The follower spring may be introduced in the magazine 58 by threading the same thru the aperture 581 until the spring is entirely within the magazine 58. By inserting an implement, such as a rod thru the aperture 581 in the end cap 61 or in the slot 60 the follower spring 66 may be compressed sufficiently until the end convolution is forced past the feeding opening 72 permitting the insertion of a stop, such as a ball 582, to permit the latter to engage with the aperture 581. When the implement is withdrawn the end convolution of the spring will engage the stop element 582 securely holding the spring within the magazine tube.

It will be observed that the rearward end of the rack member 29 co-acts with an arm 75 of the double arm locking member pivoted on the pin 18. While the gun is being cocked the base of the rack member 29 will pass beneath the head of the arm 75 thus locking the trigger during the cocking operation. When the rack member is brought to its home position the arm 75 is unlocked permitting manipulation of the trigger. When the trigger is pulled the arm 75 will block the rack member 29 thus locking the forearm against operation. This interlock prevents the gun from being fired when in a partially cocked position, and it also prevents any pull on the trigger lever when the gun has already been cocked and the forearm is away from its home position.

This mechanism also acts as a "safe" since it will be obvious that when the gun is cocked and held or carried at an angle the weight of the forearm will cause it to automatically move downward where it locks the trigger against accidental manipulation. When the gun is to be fired the shooter will naturally raise and hold the forearm with one hand in its normal position at which time the trigger locking mechanism is disabled. In some instances it may be desirable to prevent this action and in this case any suitable means may be provided to hold the forearm in its normal position by a spring detent or a friction device.

In order to further simulate the appearance of a powder gun the false barrel 10 and action bar housing 15 are enclosed by a sheet metal receiver 76 which carries at its lower end a trigger guard 77. The forward end of the receiver 76 is provided with circular holes thru which the barrel 10 and the action bar housing 15 may pass. The receiver 76 carries the stock 78 of the gun by means of a pin 79. In assembly the receiver is passed over the barrel and powder reduction housing and when these units are assembled together the trigger lever 48 is placed in its proper position and the units attached together by means of the pin 49 which is preferably a removable screw.

The false barrel 10 carries an adjustable rear sight 80 and front sight 81 which, in the present instance, is formed of sheet metal and securely attached to the upper periphery of the front of the barrel 10 by welding.

By the construction disclosed certain important advantages are attained. The "floating gear" and rack construction of the cocking mechanism affords a differential action of large mechanical advantage between the forearm and the piston rod. Thus, by a long movement of the forearm, a stiff power spring can be cocked with ease. The forearm action is seen to be similar to the forearm action in slide action firearms.

The greatly increased velocity of the shot and efficiency of transmission of power from the main spring to the shot is due to the extremely high initial compression of the air, attained by the sealing of the air chamber against leakage.

The combination of the spring shot feed of the magazine with the dished surface of the abutment insures the certain delivery of a single unmutilated shot to the barrel at each operation of the action.

The entire path of the shots thru the gun comprising the magazine and barrel may be cleared for inspection and cleaning without the use of any special tools and without any deformation of any parts, such as, rivets or lugs. The taking of the shock of the plunger ultimately upon the plunger stop abutment which is preferably transmitted to the front supporting tube and the riveted connection

to the front end of the action bar housing makes it possible to use a false barrel of very light material and thus improves the appearance of the gun as well as relieves the shooting barrel and false barrel of any shock and strain.

The interlocking mechanism provided prevents any accidental or irregular operations of the gun magazine and to a great extent prevents accidents thru faulty manipulation by the shooter.

While the form of mechanism herein described is admirably adapted to fulfill the objects primarily stated, it is to be understood that it is not intended to confine the invention to the one form of embodiment herein shown, since it may be embodied in various forms, all coming within the scope of the claims which follow.

What is claimed is:

1. The combination of a shooting barrel, a channel strip arranged parallel thereto forming a shot-holding magazine laterally communicating at one end with the shooting barrel, a follower including a coil spring, a cap carried by said magazine and barrel having an aperture for introducing said spring in the channel, said aperture being of less diameter than said magazine, and a stop element larger in diameter than said aperture positioned between said spring and said cap.

2. The combination of a shooting barrel, a channel strip arranged parallel thereto forming a shot-holding magazine laterally communicating at one end with the shooting barrel, a follower including a coil spring, a cap carried by the barrel and channel having an aperture registering with the channel for introducing said spring in the channel, a ball insertible in the channel, and adapted to engage said spring and register with the aperture in said cap.

3. In a gun, the combination of a shooting barrel, a magazine barrel containing shot arranged parallel thereto and apertured for the transfer of the shot from the magazine to the shooting barrel, a cap having a concave slot adapted to receive the ends of the magazine barrel and shooting barrel, said transfer being guided by the concave slot of said cap.

4. In a gun, the combination of a shooting barrel, a magazine barrel, said barrels being formed by bending a strip of metal S shaped, and end caps received by said barrels.

5. In a gun, the combination of a shooting barrel, a magazine barrel, said barrels being formed by bending a strip of metal S shaped, and a slot formed by cutting the edge of the metal strip prior to the bending operation.

6. In an air gun, the combination of a false barrel, tubes located therein, one at each end of the barrel and securely attached thereto, ears integral with said tubes, and an auxiliary housing attached to and supported by said ears.

7. In an air gun, the combination of a false barrel, an auxiliary housing, and means for attaching the housing to said barrel comprising a plurality of tubes within said barrel and having integral ears pinned to said housing.

8. In an air gun, the combination of a false barrel, lugs depending from said barrel and an auxiliary housing positioned to one side of said barrel pinned to and supported by said lugs.

9. In an air gun, the combination of a false barrel having depending ears, an auxiliary housing positioned to one side of said barrel having slots adapted to receive said ears, and means for securing the ears to said housing.

10. In an air gun, the combination of a false barrel, cylindrical tubes within said barrel, ears depending from said barrel, an auxiliary housing and means for securing the ears to said housing whereby the housing is supported by and positioned parallel to and to one side of the false barrel.

11. In an air gun, the combination of a false barrel, a tubular spring actuated plunger, a tube mounted within the false barrel, a plunger stop plug abutting the rear end of the tube, and a cushioning member interposed between said plug and the plunger.

12. In an air gun, the combination of an air compression barrel, a tubular spring actuated plunger reciprocable therein, an abutment tube mounted within said barrel and adapted to act as a stop for said plunger, an auxiliary housing and a connection between said tube and said housing adapted to absorb the shocks caused by the release of the spring actuated plunger.

13. In an air gun having a spring actuated plunger, an abutment tube for the plunger, and a false barrel supported by said tube out of shock transmitting contact with said abutment tube.

14. In an air gun having a spring actuated plunger, an abutment tube for the plunger, a false barrel supported by said tube out of shock transmitting contact with said abutment tube, an auxiliary housing, and connecting means between said abutment tube and auxiliary housing adapted to transmit the shocks to said auxiliary housing.

15. In a gun, the combination of a frame, a barrel and an auxiliary housing telescopically engaging said frame, a trigger including a pivot pin, said pin adapted to attach the barrel and auxiliary housing to the frame.

16. In a gun, the combination of a frame, a barrel and an auxiliary housing telescopically engaging said frame, a trigger carried by said frame and provided with a pivot pin, said pin adapted to attach the barrel and auxiliary housing to the frame.

17. In an air gun, the combination of a

power storage mechanism including an operating device, a trigger, a sear co-operating with the power storage mechanism, and an interlocking lever interposed between the sear and trigger adapted to lock either the trigger or operating device upon a partial operation of the other.

18. In a gun, the combination of an actuating member, a gear, means whereby said member shifts the pivot of said gear, a piston rod, and a member engaged by teeth on said gear adapted to shift said piston rod on movement of said actuating member.

19. In a gun, the combination of an actuating member, a stationary rack, a gear unit driven by said actuating member and adapted to roll over the stationary rack, a rack piston rod and a member driven by said gear unit and adapted to shift said piston rod.

20. In an air gun, the combination of a movable actuating member carrying rack teeth, a floating gear unit meshing with said teeth, a plunger, and a rack slide meshing with said gear unit adapted to shift said plunger.

21. In an air gun, the combination of a movable actuating member carrying rack teeth, a floating gear unit meshing with said teeth, a plunger, a rack slide meshing with said gear unit adapted to shift said plunger and a rack stationary with respect to said actuating member meshing with said gear unit.

22. In a gun, the combination of a shooting barrel and a magazine tube, said tube and barrel being formed from a single strip of metal by bending the strip into two reversely curved portions substantially in the shape of the letter S.

23. In a gun, a plunger, a longitudinally slidable action bar for actuating said plunger, a forearm slidable relative to said bar, and motion transmitting means interposed between said forearm and said bar.

24. In a gun, a plunger, a longitudinally slidable action bar, means interposed to impart movement of the bar to the plunger, a longitudinally slidable forearm movable relative to said action bar and geared to impart movement to the bar.

25. In an air gun, a plunger, a longitudinally slidable action bar formed from a strip of metal bent substantially U-shape in cross section, the sides of the bar at its rear end being joined together to form an engaging portion for said plunger, and operating means for said bar.

26. In an air gun, a plunger, a longitudinally slidable action bar, a trigger and a trigger operated safety member, said action bar being formed at its rear end with a projection engageable with said plunger and another projection engageable with said safety member, and operating means for said bar.

27. In a gun, a receiver frame, an assembly including a barrel and an auxiliary housing, said assembly detachably engaging said frame, a trigger and a removable pivot pin therefor, said pin detachably securing the assembly to the frame.

28. In a gun, an assembly including a barrel, a plunger housed therein, an auxiliary housing tube supported by the barrel, actuating mechanism for said plunger housed in said tube, a frame telescopically receiving said assembly, a trigger and pivot pin therefor, said pivot pin passing through said frame and tube to secure the assembly to the frame.

29. In a gun, a housing, an action bar provided with a rack portion, a pinion engaging said rack portion, a slidable forearm, a gear movable on movement of said forearm, said gear and pinion being interconnected to form a floating unit movable relative to said housing.

30. In an air gun, an assembly including a barrel tube and an auxiliary housing tube positioned alongside each other and secured together as a unit, a frame, a trigger and a removable pivot pin therefor, said pin passing through said frame and one of said tubes thereby detachably securing said assembly to said frame.

31. In a gun, a plunger and manipulating means therefor, a trigger member, a plunger engaging sear, a safety member interposed between said trigger member and sear and operable to lock and unlock said manipulating means, and a spring interposed between said sear and said safety member urging said sear into plunger engaging position and said safety member into unlocking position.

32. In a spring air gun, means for compressing the spring comprising an actuating member movable longitudinally of the barrel, a rack bar carried thereby, a stationary rack bar, a rolling rotary member having a geared engagement with said stationary and movable rack bars to travel at a reduced speed and with increased power and a member actuated by said travelling rotary member for compressing the spring.

33. In a spring air gun, means for compressing the spring comprising an actuating member movable longitudinally of the barrel, a rack bar carried thereby, a second oppositely facing rack bar spaced therefrom, a rotary member between said rack bars and having two gears of different diameters respectively in rolling engagement with said rack bars and a member for compressing the spring connected to be actuated by the mechanism at a speed and power determined by the ratio between said gears.

CRAWFORD C. LOOMIS.