March 25, 1924. 1,487,801

J. D. PEDERSEN

FIREARM

Filed July 14, 1920 5 Sheets-Sheet 1

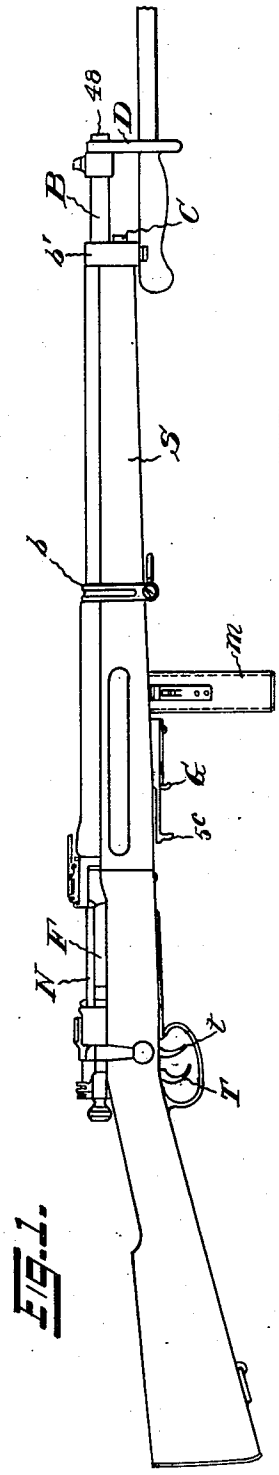


Fig. 1.

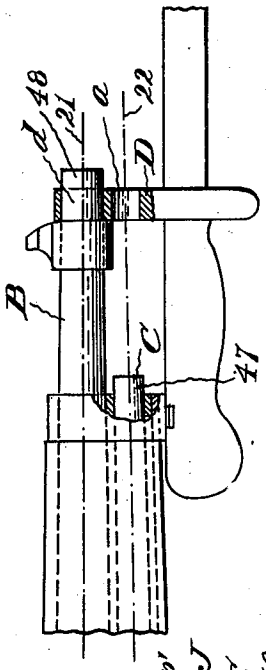


Fig. 2.

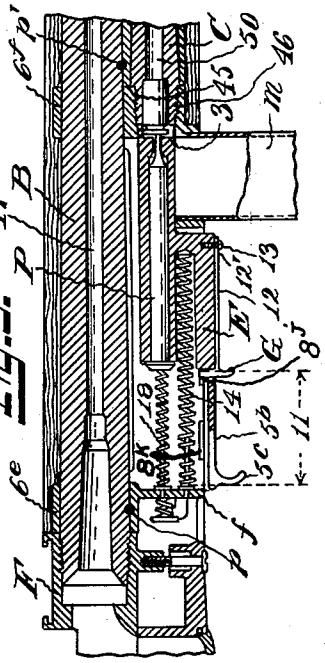


Fig. 3.

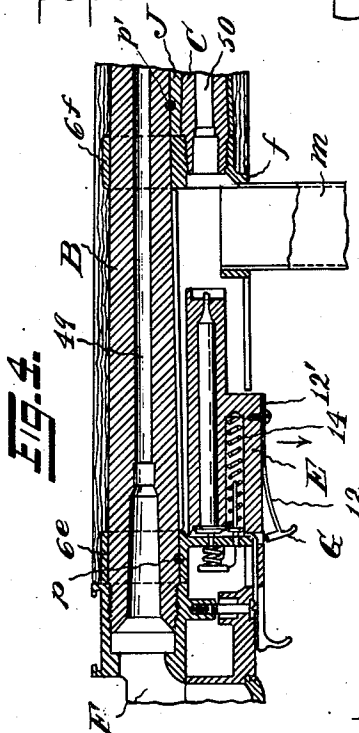


Fig. 4.

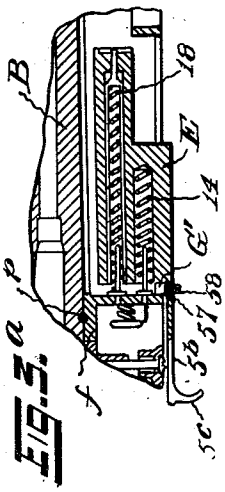


Fig. 5a.

Inventor:
John D. Pedersen,
By his Att'y, F. H. Richards.

March 25, 1924. 1,487,801

J. D. PEDERSEN

FIREARM

Filed July 14, 1920 5 Sheets-Sheet 2

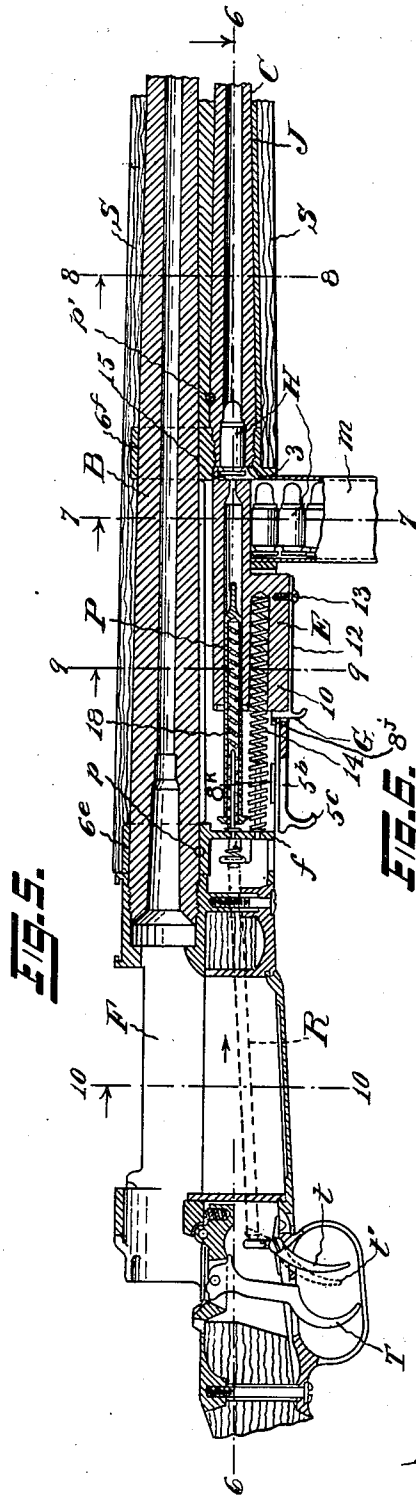


Fig. 5.

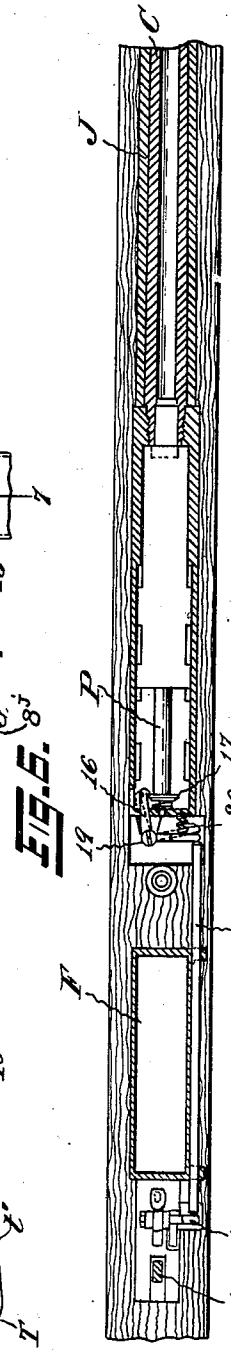


Fig. 6.

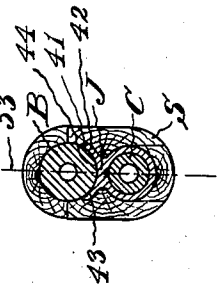


Fig. 8.

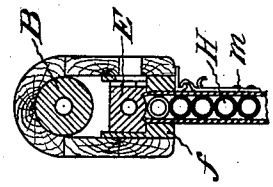


Fig. 7.

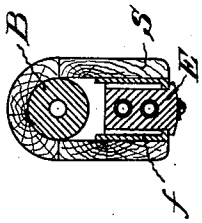


Fig. 9.

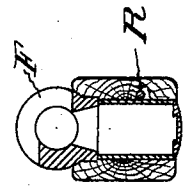


Fig. 10.

Inventor:
John D. Pedersen,
By his Att'y, F. W. Richards.

March 25, 1924. 1,487,801

J. D. PEDERSEN

FIREARM

Filed July 14, 1920 5 Sheets-Sheet 3

Fig. 11.

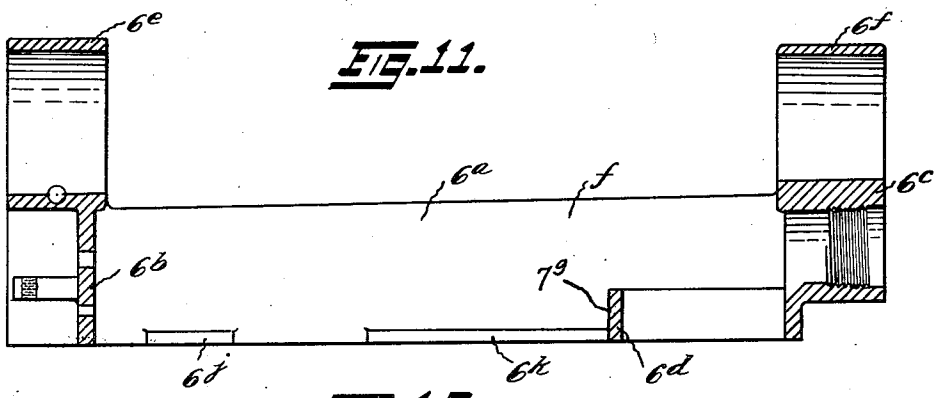


Fig. 12.

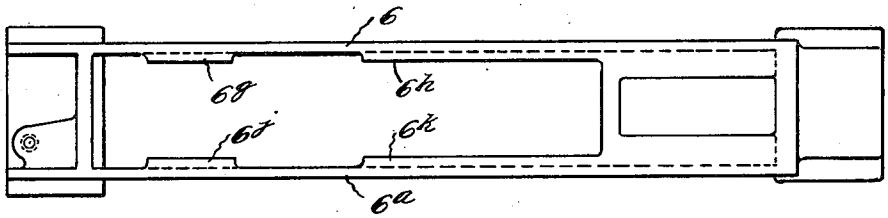


Fig. 13.

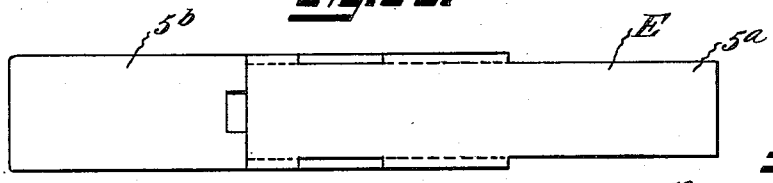


Fig. 15.

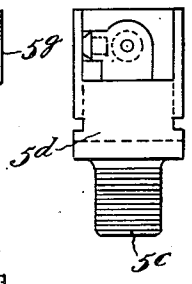


Fig. 14.

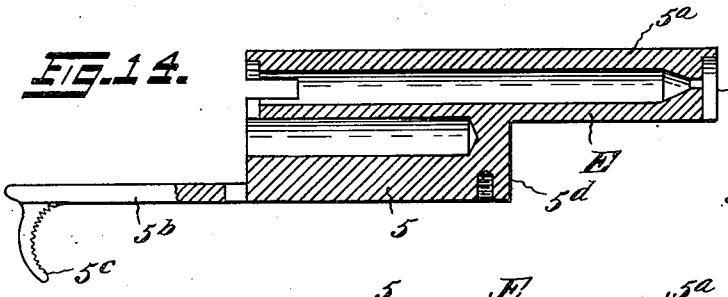
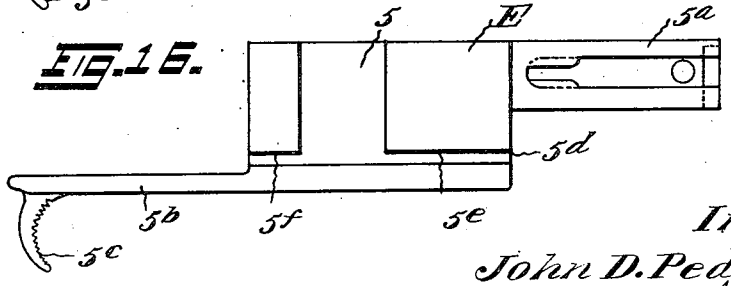


Fig. 16.



Inventor:
John D. Pedersen,
By his Att'y, F. H. Richards.

March 25, 1924. 1,487,801

J. D. PEDERSEN

FIREARM

Filed July 14, 1920 5 Sheets-Sheet 4

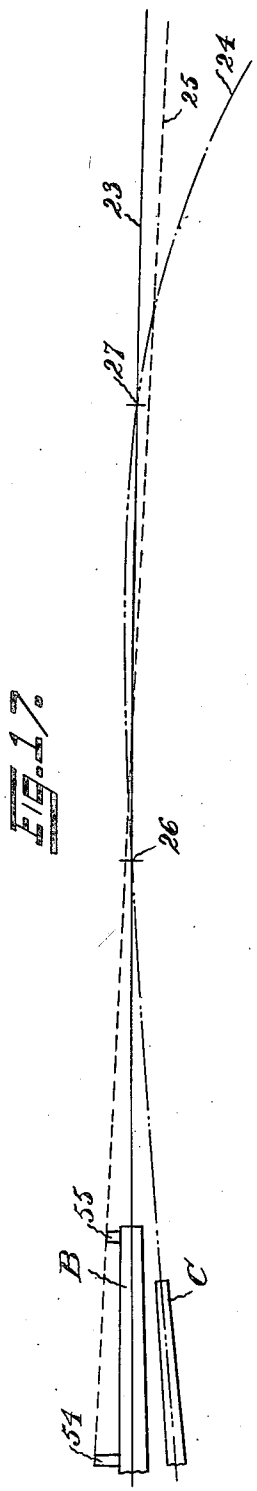


Fig. 17.

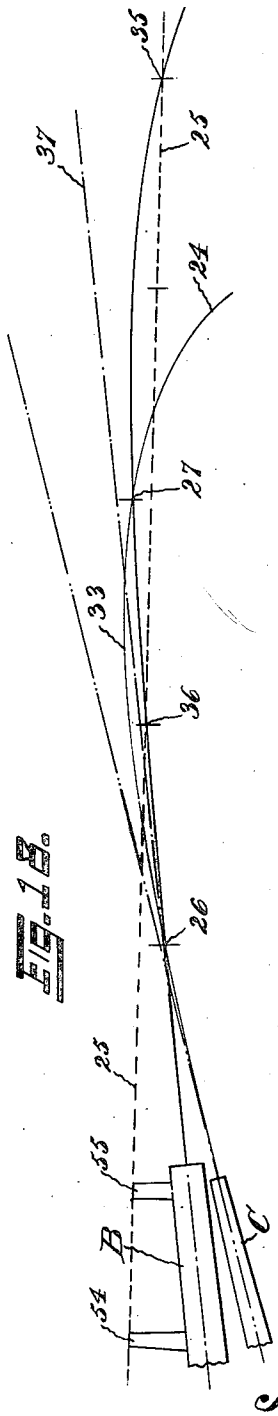


Fig. 18.

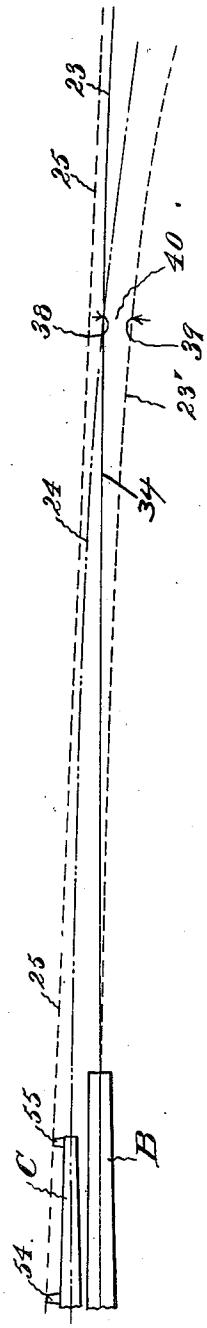


Fig. 19.

Inventor:
John D. Pedersen,
By his Att'y, F. W. Richards

March 25, 1924. 1,487,801

J. D. PEDERSEN

FIREARM

Filed July 14, 1920 5 Sheets-Sheet 5

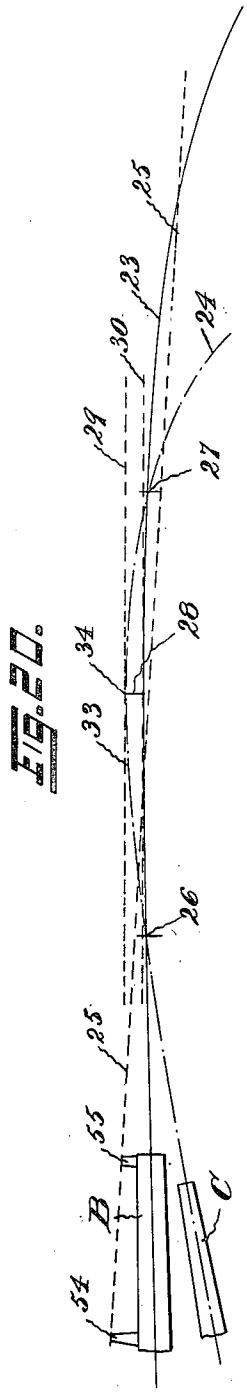


Fig. 20.

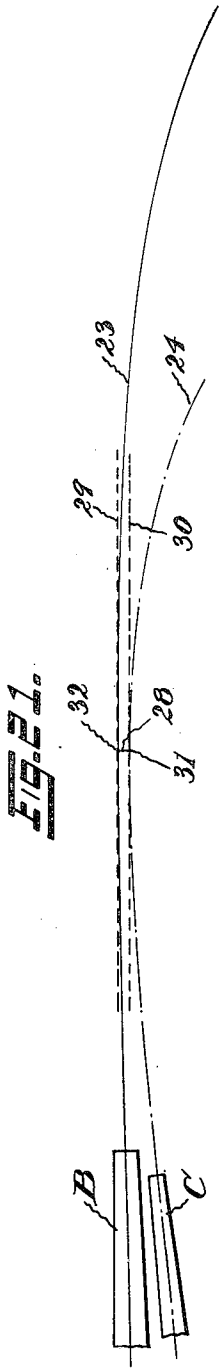


Fig. 21.

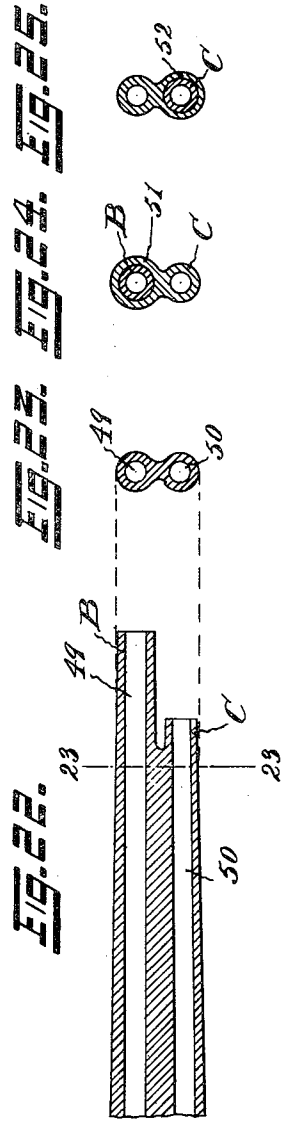


Fig. 22.

Fig. 24.

Fig. 25.

Inventor:
John D. Pedersen,
By his Att'y, F. H. Richards.

Patented Mar. 25, 1924. 1,487,801

UNITED STATES PATENT OFFICE.

JOHN D. PEDERSEN, OF JACKSON, WYOMING.

FIREARM.

Application filed July 14, 1920. Serial No. 396,215.

To all whom it may concern:

Be it known that I, JOHN D. PEDERSEN, a a citizen of the United States, residing in Jackson, in the county of Lincoln and State of Wyoming, have invented certain new and useful Improvements in Firearms, of which the following is a specification.

This invention relates to firearms for using two kinds or sizes and powers of ammunition, having respectively long range and short range projectiles. A principal object of the invention is to furnish a weapon of that class comprising a pair of firearms,—preferably each having a magazine,—one for each of said purposes, respectively combined in a system whereby each of said firearms may be used either independently of or concurrently with the other, and so arranged that while the gunner may be using one or a first said firearm the other or second one may be held loaded and the magazine thereof fully charged, in readiness for instant use without regard to the use or non-use of such firearm.

A further object is to furnish a composite or compound firearm of said class in which the two trajectories may be so located that the trajectory of the short-range projectiles may cross that of the long-range projectiles in two points, and thereby provide for the proper sighting of each said firearms by the use of the same sights, and without requiring any changing thereof.

While it has been customary to regard the barrel of a shoulder-arm as being carried by the receiver,—this being regarded as the frame,—it should be noted that the reverse of that view is equally correct, and in my present improvements, the main barrel is shown arranged to constitute the carrying member for the cartridge-supplying and firing means for both of the barrels. Thus the present system (herein represented in a shoulder-arm form thereof) comprises two complete firearm mechanisms, each operable independently of the other, these two firearms, however, being organized into one combined pair in which the two have both structural and functional coactive relations.

In the present description, the two individual firearms composing this two-mechanism system are sometimes referred to, one of them as the larger or main firearm, and the other as the small firearm; also, as the large barrel firearm and small-barrel firearm. It should be understood, however, that such terms as "large" and "small" or other words of similar import or application, do not necessarily or impliedly refer to the bore of the barrels, unless clearly so stated, but rather to the size or weight, or both, since, in practice, while the two barrels may have bores of the same diameter, the rapid-fire or lower (and usually shorter) barrel does not need to be nearly as large externally as the upper or main barrel.

Since the present invention is more especially intended for use in military firearms, the form of the primary or large barrel firearm represented in the drawings, is designed to substantially correspond with the so-called "Springfield rifle"; but, in practice, if required, other kinds or styles of shoulder-arms barrels and mechanisms may be employed in lieu thereof.

In the accompanying drawings forming a part of this specification, Fig. 1 is a side-view, drawn on a small scale, for illustrating the general arrangement of a firearm of the shoulder-arm class having the elements thereof organized in accordance with the present invention.

Fig. 2 is an enlarged fragmentary front end view of Fig. 1, partly in section, showing the aperture in the bayonet shank for passage of the projectile from the rapid-fire barrel.

Fig. 3, is an enlarged fragmentary vertical section of the rapid-fire mechanism in fire position. Fig. 3^a is a view similar to Fig. 3, showing a portion of the firing mechanism, the bolt thereof being in extreme rear position, and showing a modified form of stop for the bolt.

Fig. 4 is similar to Fig. 3, with the rapid-fire firing mechanism in position for disassembling.

Fig. 5, is an enlarged fragmental vertical section showing the long-range and rapid-fire firing mechanisms, the rapid-fire firing mechanism being in firing position.

Fig. 6, is a section on the line 6—6 of Fig. 5 in the direction of the arrow, the rapid-fire firing mechanism being shown.

Fig. 7 is a detail sectional view on the line 7—7 of Fig. 5.

Fig. 8 is a detail sectional view on the line 8—8 of Fig. 5.

Fig. 9 is a detail sectional view on the line 9—9 of Fig. 5.

Fig. 10 is a detail sectional view on the line 10—10 of Fig. 5.

Fig. 11 is a vertical sectional view, on an enlarged scale, of a portion of the frame of the firearm.

Fig. 12 is a bottom plan view of the portion of the frame shown in Fig. 11.

Fig. 13 is a top view, on an enlarged scale, of a bolt and block member.

Fig. 14 is a sectional side view of said bolt and block member.

Fig. 15 is an end view of said bolt and block member.

Fig. 16 is an exterior side view of said bolt and block member.

Figs. 17, 18, 19, 20 and 21 are diagrammatic views for illustrating projectile trajectories.

Fig. 22 is a fragmentary sectional view of the main and secondary barrels illustrating an integral arrangement thereof.

Fig. 23 is an end view of the arrangement shown in Fig. 22.

Fig. 24 is an end view of the main and secondary barrels illustrating another form of arrangement of these barrels.

Fig. 25 is an end view of the main and secondary barrels illustrating still another arrangement of these barrels.

In said primary firearm in the form thereof herein shown, (see Figs. 5 and 6), the barrel B is relatively large and rigid and to the rearward and larger end thereof, has attached thereto a chambered mechanism frame, or "receiver," as F, for containing the usual loading, firing and shell-ejecting devices or means.

Said receiver is represented as being imbedded in the usual "stock," or shoulder-piece, (Fig. 5), which extends forward of the receiver to form the forestock, S; this is shown fixed in place below the barrel B, and may be formed in a separate piece from the shoulder piece, in a well-known manner, if desired. This forestock may be held in position by ordinary bands b, b'. In Fig. 2, the usual bayonet shank, D, is indicated as being applied to the barrel B in the usual manner, which, being well known need not be shown, as d, which shank is provided with an aperture a, through which may pass the projectiles fired from the small-barrel C, when the bayonet is in place on the firearm.

A further feature of the present system relates to the manner in which the small-barrel firearm and the operating mechanism thereof, is housed within the fore-stock of the large-barrel firearm. Thus the small-barrel and rapid-fire weapon is not only protected from injury (and largely hidden from observation), but is in constant readiness for instant use, by simply attaching a filled magazine. In practice, the soldier when going into action, should first put in place the magazines of each said firearm so that either one of these may be first used or the two used alternately as occasion may require.

The frame f of said smaller mechanism being located directly below said main barrel B, the fore stock S is shown chambered to fit over, or outside of said frame, and thereby furnishes a guard or covering therefor, so the operator may safely grasp the arm in a position forward of the main frame F and rearward of the magazine, as m, which extends downwardly from said smaller frame f.

This frame, f, is shown in a preferred form thereof in Figs. 11, 12. The two side-walls 6, 6^a, are connected by a rearward part 6^b, and a forward end portion 6^c, and by a cross-wall 6^d, rearward of the magazine socket. Said side-walls 6, 6^a, are further united by the rearward and forward main-barrel clasps, 6^e, 6^f, respectively; these are fitted to firmly close out the tapering barrel B, when this lower frame is forced rearwardly over said barrel B, and thus brought against (or near to) the receiver F of the large-barrel, or primary firearm in the process of assembling. When thus assembled, a cross-pin, as p, (Fig. 5) may be used for releasably holding the frame f upon its said carrier member, or barrel, B. In Figs. 11, 12, guides 6^g, 6^h, on one side, and 6^j, 6^k, on the other side, are shown arranged for engaging and guiding the power-block, at 10, Fig. 5, of said mechanism of the small-barrel firearm.

The form of combined power-block and breech-bolt E shown in the drawings, Figs. 13 and 16 inclusive, comprises a slidably-supported main portion 5, the forward extension, or breech-bolt 5^a, and a lower and rearward extension, 5^b, provided with a handle or finger-piece 5^c. This rearwardly extending part, 5^b, serves as a chamber-closer, or guard plate when the block is in forward position, as will be seen by comparing Figs. 3 and 5. In this firing-position of the power-block, Fig. 5, the bolt-portion 5^a extends over the magazine m, and comes close to, but preferably not quite into contact with, the rear end face, 3, of the barrel C; this forward movement of said block E is herein shown as being limited by a transverse face 5^d, of the block coming into contact with a corresponding face 7^g of the transverse wall 6^d, of the frame f.

The rearward movement or working-stroke of block E may be limited by a stop, as G, engageable in recesses 8^j, 8^k in the frame f, Figs. 3 and 5 arranged to be withdrawn when desired, to thereby permit said block to be retracted to the more rearward position thereof in Fig. 4, for thereby disengaging the bearing faces 5^e, 5^f, Fig. 16, and the corresponding faces, not shown, of the block from the guides 6^g, 6^h, 6^j, 6^k, of

the frame, whereupon the block may be lowered directly downwardly out of the frame *f*, when disassembled, and may be replaced by following a reverse operation. To provide for these operations, said guides 6^g, 6^h, 6^j, 6^k, are shown of suitable length and are suitably positioned to engage by a sufficient distance, as 11, (Fig. 3), when, in the assembled mechanism, said block E is retracted only to the end of its said normal working stroke.

Said block retraction-limiting stop, G, may be operably supported by attachment to one end of a flat spring as 12, (Figs. 3 and 4), the other end 12′, of which is removably affixed, as by a screw 13 to the block E or to some part appurtenant thereto. In Figs. 3, 4 and 5, this attachment is made by extending said stop carrying member, 12, forwardly from the stop and there fixing said member by a screw 13, to the aforesaid rearward extension 5^b of the power-block. However, other forms of such a stop may be employed if desired, and in Fig. 3^a is shown one such other form, it consisting of a plug, G′, having a threaded portion 57, and slotted head 58, whereby this stop may be placed and removed after the manner of an ordinary machine-screw.

In the present instance, I have illustrated my present improvements by an arrangement of mechanism operating on the so-called "blow-back" principle, this being, in practice, one of the more simple kinds. This system, however, requires a slide or reaction member having a considerable weight relative to the power of the cartridge to be used, and hence is not so well adapted for using high power cartridges when the total weight of the firearm is limited.

The cartridge as H, having been properly placed in barrel C (Fig. 5), on being fired reacts against slide E, which thus constitutes a reaction member or power-slide. The weight of slide E should be such that the cartridge,—this being specially designed and loaded therefor,—will impart to said slide a rearward movement of sufficient stroke and power to perform, directly or indirectly, the subsequent operations of shell-extraction and ejection, and of reloading the firearm.

On being driven back from the firing position thereof, Fig. 4, the slide compresses the operating spring 14, and retracts the bolt-face 5^g rearward of the uppermost cartridge in the magazine *m*, so that on a forward actuation of the slide to firing position, said bolt face drives said cartridge out of the magazine and into the barrel-chamber, as at 15, Fig. 5. If, during said loading operation, the sear-hook 16, stands forward or up (as in Fig. 6), the sear-hook will engage with the face 17 of the firing pin P, and thus hold said pin retracted until after the loading-in operation is completed, so the several said parts will be positioned as indicated in Fig. 5, ready for firing the cartridge; this is now accomplished, in the specific form of devices shown, by pulling back trigger *t*, which by means of the intermediate push-rod R, acts to retract the sear to the firing-pin-releasing position shown in dotted lines, Fig. 6. Said pin P being thus released is driven forward by its actuating spring 18, and the point thereof strikes the cartridge H, thereby firing the cartridge in the usual manner.

The operator may now proceed in either one of two ways. First, on having released the firing-pin as described, he may instantly release the trigger and thereby restore the sear-lock to its firing-pin engaging position, so that the bolt-mechanism (this being cartridge-actuated as before) will reload the barrel and then remain idle, but in firing position. Or the operator may hold the sear retracted, and out of its said firing-pin-engaging position, until after the completion of said loading operation. In this case, the firing pin normally is driven forward by its spring 18, and upon the sudden stoppage of the slide E (by the cartridge being fully seated in the barrel) acts by its momentum to fire the cartridge and thus inaugurate a second loading operation. Thus, by holding the sear retracted, the loading and firing operations become automatic and may so continue until the supply of cartridges in the magazine is exhausted.

In this automatic mode of action, the slide E is driven forward by its spring 14 at the same time the firing-pin P is driven forward by the spring 18, and thus said members E and P, are advanced by the concurrent action of the two springs 14, 18, thereby obtaining a maximum acceleration of the loading operation, or loading-in movement of the sliding bolt E, which also increases to a maximum,—in view of its weight,—the momentum of said pin P, for effecting the firing of the cartridge in the manner explained. To insure an effective action of the firing-pin, by its momentum when going forward with the slide, this pin may be made of such weight as may be found necessary or desirable in any particular instance.

In some instances, the two barrels B, and C may be arranged if desired, with parallel axes, or center lines, but a forwardly and upwardly converging of the axis of the barrel C relative to the barrel B, as indicated by lines 21, 22, respectively, in Fig. 2, is deemed to be preferable, especially for these firearms when constructed for use as military rifles, the barrel C being arranged beneath the barrel B. For this use the heavier

projectiles used in main barrel B will have (the same as those now employed) a low, or "flat", normal trajectory, being of high-power and long range. The projectiles for the small barrel will be ordinarily, of less weight and power and consequently of shorter range, suitable in fact, for the close-range work for which the small barrel firearm is especially intended. This relation of the two normal trajectories is indicated in the diagram Fig. 17, where the slightly curved line 23 represents the long-range normal trajectory, and the similar but more curved line 24 represents the short-range normal trajectory from the small-barrel C, the sight-lines being approximately represented by dash-line 25. It will be noted that said trajectories cross at points 26 and 27 and between these points have only a slight deviation, the one from the other, so that within a considerable distance, the sights as adjusted for the large barrel B are also sufficiently correct for the small barrel C. Thus the soldier when surprised by a nearby enemy (and having both magazines in place) can instantly bring into action the rapid-fire automatic mechanism without having to change the sights or make any allowance for the different range.

In preparing for the manufacture of the firearm, and in the arranging of the amount of said barrel-axes convergence this may usually be made less in angular measurement than the taper of the main barrel B, so that when the small-barrel C is truly cylindrical, the space between the two barrels may be greater at the forward end of said small barrel than it is near the rearward end thereof. This arrangement permits the heat-transmitting, or filling piece J, (hereinafter more fully described) to have a corresponding taper, depth-wise thereof, so that it may be slid onto said small barrel with the frame *f* from the front end thereof, when the forward fastenings at *bb'* and the front end stock S are first removed; and thus brought into a close-fitting relation to said upper barrel B.

In Fig. 20, at a position indicated by line 28, this being intermediate to the two trajectory intersections 26 and 27, the two trajectory curves 23, 24, are tangent, respectively, to two straight lines 29 and 30, which are parallel. Thus it may be said that at a position remotely distant from the barrels,—preferably in a mid-range zone,—the normal trajectory-curve having the small curvature, and the normal trajectory-curve having the relatively greater curvature, have at such position, parallel tangent lines. For securing this result, the second barrel C is to be properly positioned relative to said main barrel B, for bringing said trajectory curves into the described relationship; this readily may be done by the use of suitable barrel-holding means whereby said second barrel will be fixedly positioned in the firearm and relative to the main barrel in a non-parallel manner, so that the axes of these barrels will have a sufficient amount of the forward axial convergence.

Should the cartridges used in said second barrel C, be of an abnormally low power, the trajectory-curve 24 of Fig. 21 would, of course, be lowered accordingly; such a result is indicated by line 24, where said trajectories 23, 24, do not actually intersect each other.

In this instance, however, the curve 24, at some position, as 31, which is remotely distant from the muzzle-ends of the barrels, is tangent to a line, 30, which is parallel to another line, 29, that is tangent at 32 to said other trajectory 23. Thus the tangency relation to parallel lines as above described, applies equally to the trajectory positions illustrated in Figs. 20 and 21 respectively.

The said mid-range zone is deemed to be located in space at a position about mid-way of that arc (as 33, Fig. 20) of the short-range normal trajectory, 24, which lies above the battle-range sight-line, as 25, for the normal trajectory-curve 23, of the long-range barrel, B. In Fig. 20, said mid-range zone may be regarded as extending from point 26 to point 27; but, while the measurement of this distance may be varied in practice, the point of tangency as 34, Fig. 20, should ordinarily be as remotely distant from the firearm barrels, as the point, 26, at which the short-range normal trajectory 24 first intersects the long-range normal trajectory 23.

In the diagram Fig. 18, line 25 represents the so-called battle-range sight-line, which meets the long-range normal trajectory at a distant point, as 35; in practice this distance may be assumed as being 500 yards, an approximate midway point, as 36, of said battle-range may be about 200 yards remotely-distant from either end of said range. Also, in Fig. 18, the short-range normal trajectory, 24, is shown so located, due to the positioning of lower barrel B, as to bring the intersection points 26, 27 approximately midway from the barrel C to the point 35. The arc 33 of said short-range trajectory extends from the first intersection point 26 to the second intersection point 27, and, for convenience, is herein designated as the "intersection arc." Thus said arc 33 may be said normally to extend substantially equal distances forwardly and rearwardly of the approximating midway point 36 of the battle-range length, or portion, of said main-barrel trajectory.

When the main and secondary barrels are discharged concurrently, the mark at the points 26 and 27, due to this intersection of trajectories at these points, will be sub-

jected to the concentrated fire of the main and secondary barrels, and the zone between the points 26 and 27 becomes a danger zone relative to this concentrated fire, a feature particularly valuable in use of the firearm as a military weapon.

The precise location of said sight line 25 may be determined, in practice, by the usual rearward and forward sights, as 54, 55, respectively, which are herein shown only in a symbolic form, sufficient for the diagrammatic representations in said views Figs. 17 to 20, inclusive.

The nature and importance of said double-intersection of the trajectory in 23 and 24, and of the curvature in the same direction of the two trajectory-arc, 33, between said points of intersection, will be made more clear, by a comparison of Fig. 18, with the lines shown in Fig. 19, in which the long-range barrel B, has the axis thereof in line 34. If, now, a short-range firearm should be placed above main barrel B, as for instance, Fig. 19, the trajectory 24, can intersect said long-range trajectory 23, in only one point, as 38. And, when a short-range projectile is fired from the main-barrel B, (of the long-range firearm), its trajectory 23′, diverges downwardly from the long-range trajectory 23, so that at a short distance away, as at 39, the amount, 40 of such divergence will be too great for satisfactory results, unless a different sighting shall be specifically provided therefor, and this method is not a dependable one, in practice, since it adds another feature requiring forethought and attention by the soldier at a time when he cannot be trusted to meet any such extra requirement. But, by means of the present improvement, as clearly indicated in Figs. 18 and 20, the soldier is relieved of all such responsibilities, since the one pair of sights are properly usable at all times for both firearms of the system.

The herein described combining of said pair of firearms in a system having the short-range arm below the barrel of the long-range arm, and the axial convergence thereof as set forth, accomplishes the novel and important result explained as regards the sighting, and one which is not obtainable in composite firearms having the small-barrel above the large-barrel firearm, nor in such arms as the "Morris tube" or others in which the two kinds of projectiles, long-range and short-range, are used alternately in the same bore. In these cases, the two trajectories can cross or coincide but once, and in the latter said cases the two trajectories are tangential at the muzzle of the barrel, and thence constantly diverge, without crossing at any point of distance.

In thus describing said forward convergence of the barrel axes it has been assumed for convenience, that the so-called "line of departure" of the projectile coincides with the barrel axis. It is known however that said line of departure may not exactly coincide with the structural axis of the barrel, and hence it is to be understood that when, in the process of sighting (as this is now practiced by adepts in this special art) it is found that such line of departure varies materially from said structural axis, then the aforesaid adjustment of barrels, alinement, or divergence, should be based upon the lines of departure as ascertained for the two barrels B, and C, respectively. Hence the term "barrel axis" as herein employed is intended to refer to said line of departure or functional axis, should this, in any given instance, differ materially from the said structural axis.

The intersecting of trajectories which is herein described in respect of Fig. 18, and which is specified in certain of the claims, should be understood as referring to the crossing of the long-range trajectory 23, by the short-range trajectory, 24, when these are considered as they would appear when viewed from one side of a vertical plane, this being the manner of illustration in said Fig. 18. It should be understood, however, that in practice, the actual path or line-of-flight of the short-range projectile may not, in a strict or mathematical sense, intersect the actual path of the long-range projectile, since usually there will be a slight lateral movement or sway of one or the other projectile to the right-hand or left-hand, due to windage, or to other well-known but variable causes. But these variations in the lines of flight are ordinarily of a negligible amount, especially if the firearm barrels have been duly positioned therefor; and, in any such case, the lateral variation does not impair or materially affect the said intersections as represented in said Fig. 18, nor the practical operation of the firearm as regards precision of fire.

From the foregoing description as illustrated, it will be seen that the main barrel, as B, is fitted by its rifling and construction and is equipped with cartridge-placing and firing means for the firing—on the so-called "flat" trajectory—, of long-range and relatively heavy projectiles, and therefore may be said to have the small-curvature trajectory which such projectiles normally have when fired by high-powered cartridges used in rifle-barrels of the kind referred to. Similarly the second barrel, as C, is fitted and equipped for firing projectiles of a relatively less weight, and much shorter range, being fired by relatively low-powered charges. Hence, this second barrel may be said to have a relatively greater curvature of trajectory, as compared with the described trajectory of said main barrel. And, in the complete firearm, the two said barrels,

each being specially rifled, fitted and equipped for using a class of ammunition and projectile specially suited thereto, are connected,—and supported the one relatively to the other,—by structural means whereby these barrels are fixedly positioned in the firearm to have a forward axial convergence for bringing the normal short-range trajectory of said second barrel to intersect at two successive positions, (as, for instance, at points 26, 27, Fig. 18) the normally long-range trajectory of said main barrel.

This barrel, on account of the normally rapid operation of the automatic loading and firing mechanism, naturally acquires heat rapidly and hence, (following a general principle already well-known), I prefer to provide this barrel C, with heat transmitting and radiation means for accomplishing said purposes.

For directly receiving heat from the barrel C, said barrel is shown encased in a highly conductive sleeve, as J, which may extend nearly the whole length of the barrel, and be made of an aluminum alloy, if desired. This sleeve J has a large radiating surface, and carries an upward extension 41, Fig. 8, which may be broadened out at its upper edges, as 42, 43, and be shaped to fit closely to the under surface, as at 44, for thereby transmitting a larger proportion of the heat, to said main barrel B, which thus becomes an heat-absorbing reservoir. This heat thus transferred up into barrel B, this having a large mass and surface, will be rapidly distributed along the length thereof and so radiated into the atmosphere from the large amount of the exposed barrel surface.

In practice, I prefer to rigidly but releasably fix one end,—preferably the rearward end,—of sleeve J to small barrel C and this may be done by a cross-pin as p^1 (Fig. 5), or by other suitable means. This arrangement serves to hold the rearward end-face 45, of the sleeve in fixed relation to the rearward end 46 of the barrel C, so that the sliding movement, due to variations in temperature, of the sleeve on barrel C will extend to and mostly occur near the forward end of the sleeve; to provide for this action, the sleeve should be fitted closely upon the barrel, but be readily slidable thereon under the powerful force due to the heat-variations.

A further cooling of the main barrel B may be effected by means of a peculiar feature of the described two-barrel arrangement. The forward end 47, Fig. 2 of the small barrel C, is shown located a short distance below and somewhat rearward of the muzzle, 48, of said main barrel. The gases emerging from small barrel C spread into a cone-like form and thus operate to blow forwardly the air at and surrounding the forward end, 48, of said main barrel. This in turn, tends in an evident manner to draw air through and thereby cool the bore of the main barrel, provided the rearward end thereof is open to the influx of air; for this purpose, the operator may have the main barrel unloaded when desiring to use the small barrel for any considerable number of shots.

An important advantage of this two-barrel composite fire-arm, arises from the circumstance that the long-range and short-range projectiles may each be given a speed of rotation suited to the weight and velocity of advance thereof. Thus each of the barrels B, C, can now be specially rifled each for its own special requirements, and have a degree of twist in its rifling as properly required by the cartridge and projectile to be used in the barrel. As a general rule, the rifling of the long-range barrel should have a relatively rapid twist as compared with that of the short-range barrel. And, to fire short-range projectiles through a barrel rifled for high-velocity long-range projectiles tends to produce serious alterations of movement during the flight of the short-range projectiles and thus impair or destroy precision of fire. By avoiding the said objections, the short-range ammunition is readily made to cover a greater effective range than when used in the long-range barrel of a high-power rifle, and this important gain is secured in my present improvements, in connection with the peculiar intersection of trajectories, as already explained.

In some instances, the two barrels B and C may be joined integrally either before or after the bores 49, 50, respectively are formed therein. One construction of this kind is shown in Figs. 22 and 23, where the second barrel C, is shown below the main barrel B and formed in one piece therewith. This form, however, while amply providing for a rapid transmission of heat from said lower rapid-fire barrel C to the upper and larger barrel B, has the disadvantage of being difficult to manufacture in an economical manner. A further objection is that when said lower barrel is highly heated (as necessarily occurs with rapid-fire for any considerable period), the longitudinal extension resulting therefrom operates to bend or flex the upper barrel B, and thus tends to disturb the sighting relation thereof; this is practically avoided in the more elaborate construction herein illustrated in the principal views, Figs. 3, 4, 5, 7 and 8.

The aforesaid objections are normally reduced in the modified form shown in Fig. 24, where the lower and smaller barrel C is shown integrally provided with a sleeve 51, extending over and slidably connecting with the upper and larger barrel B, so that by a sliding action of said sleeve 51 upon barrel C, each of the barrels may elongate and con-

tract longitudinally and independently of the other, without subjecting the other to a material amount of the said barrel-flexing stress. This construction may be modified in a reversely-arranged manner by the plan shown in section only, in Fig. 25, where the main barrel B is provided with a sleeve 52, within which the lower barrel C is encased in a manner to permit the described elongation and contraction thereof while preserving or providing for a large heat-transmitting contact or relation between the two barrels.

The special forms of barrel-construction illustrated in said Figs. 24 and 25 are not specifically claimed herein. In each of these forms, it will be seen, the two barrels B, C, have between them a heat-transmitting means, which is also a means of directly and fixedly positioning the smaller and rapid-fire barrel C underneath the main barrel B, these two barrels being arranged with the required forward axial convergence. In practice, when a sleeve, as 51, Fig. 24, or 52, Fig. 25, may be employed, this sleeve should, preferably be made relatively thin, so that it may readily expand diametrically in an elastic manner under the variable heating action and stress to which it may be subjected.

The intermediate heat-transmitter, as J, Fig. 8, when not integral with either barrel, has the advantage of being expansible and contractible longitudinally to a different degree from either barrel and of doing this without subjecting either barrel to any flexing stress due to such difference. This feature provides for making said member J of a metal having a higher heat-transmitting power than the metal of which the barrels are made, these being in present practice, necessarily made of steel when for use in high-power and in rapid-fire firearms. Thus, said member J may be made of copper or of a composition consisting in part of copper or like metal having a high heat-conductivity and thereby provide a highly effective heat-absorbing element acting in some respects as a heat-reservoir, and in combination with each of the said barrels.

For convenience in the describing and defining herein of devices and elements, certain terms of direction have been used (in a conventional manner) for indicating positions and relations of various members and details of the mechanism; and it is to be understood that such terms, (as for instance, up, down, above, below, forward, rearward, and the like), are intended to refer to the stated positions or relations at a time when the firearm shall be held in a normal position for use,—that is, held with the main barrel about horizontal and with the center-plane of the forestock directly underneath the axis of said barrel,—in Fig. 8, said center-plane is indicated by line 53.

In the particular form of main-barrel firearm mechanism illustrated in Figs. 1, 5, 6, the barrel B is shown of the breech-loader type, and as being equipped with a hand-operated cartridge-placing or loading mechanism, this consisting of the ordinary breech-bolt N, which is or should be supplemented by the details usually appurtenant thereto (not herein fully shown), including means for firing the loaded-in cartridge. It should be understood, however, that in some instances, or when preferred,—and within the purview of the present invention,—this firearm, instead of having said main barrel fitted with such a hand-operated equipment for the loading-in and firing operations, may have an auto-loading and firing mechanism, and that, for such purposes any suitable kind of the latter mechanisms,—of which several specific constructions adaptable therefor are already well-known,—may be so employed.

The improved cartridge-placing and firing mechanism which is herein shown and described, for the lower or secondary barrel C, is deemed to be especially suitable for use in connection with such a second barrel in a compound or two-mechanism firearm of the shoulder-arm class herein set forth. This mechanism, however, may be applied to single-mechanism firearms. Also, it should be noted that in some instances, or when desired, a different breech-action or form of mechanism may be adapted to said secondary firearm for placing and firing the cartridges for use therein.

Having thus described my invention, I claim:

1. In a firearm, in combination, a main barrel for firing long-range and relatively heavy projectiles having a normal trajectory of small curvature, and a second barrel for firing short-range projectiles having a normal trajectory of relatively greater curvature than the first projectiles; the second barrel being operatively arranged and supported in the firearm adjacently to and beneath the main barrel, the bore of the second barrel being in permanent converging forward and upward relation to the bore of the main barrel, whereby the trajectory of the projectiles from the second barrel intersects upwardly the trajectory of the projectiles from the main barrel at a point remote from the muzzles of said barrels.

2. In a firearm, in combination, a main barrel for firing long-range and relatively heavy projectiles having a normal trajectory of small curvature, and a second barrel for firing short-range projectiles having a normal trajectory of relatively greater curvature than the first projectiles; the second barrel being operatively arranged and supported in the firearm adjacently to and beneath the main barrel, the bore of the

second barrel being in permanent converging forward and upward relation to the bore of the main barrel, whereby the trajectory of the projectiles from the second barrel intersects upwardly the trajectory of the projectiles from the first barrel at a point remote from the muzzle of said barrels, and intersects said trajectory downwardly at a second point more remote from the muzzles of said barrels than said first point.

3. In a firearm, in combination, a main barrel for firing long-range and relatively heavy projectiles having a normal trajectory of small curvature, and a second barrel for firing short-range projectiles having a normal trajectory of relatively greater curvature than the first projectiles, firing mechanism and trigger mechanism for the main barrel and firing mechanism and trigger mechanism for the second barrel, the barrels being dischargeable separately or concurrently; the second barrel being operatively arranged and supported in the firearm adjacently to and beneath the main barrel, and the bore of the second barrel being in permanent converging forward and upward relation to the bore of the main barrel.

4. In a firearm, in combination, a main barrel for firing long-range and relatively heavy projectiles having a normal trajectory of small curvature, and a second barrel for firing short-range projectiles having a normal trajectory of relatively greater curvature than the first projectiles, firing mechanism and trigger mechanism for the main barrel and firing mechanism and trigger mechanism for the second barrel, the barrels being dischargeable separately or concurrently, and the second barrel being operatively arranged and supported in the firearm adjacently to and beneath the main barrel, and the bore of the second barrel being in permanent converging forward and upward relation to the bore of the main barrel.

5. In a firearm, in combination, a main barrel, a second barrel arranged in the firearm adjacently to the main barrel, firing mechanism and trigger mechanism for the main barrel, and firing mechanism and trigger mechanism for the second barrel, the barrels being dischargeable separately or concurrently, and the second barrel being dischargeable automatically at will for rapid fire thereof.

6. In a firearm, in combination, a main barrel, a second barrel arranged in the firearm adjacently to the main barrel beneath the main barrel, firing mechanism and trigger mechanism for the main barrel, and firing mechanism and trigger mechanism for the second barrel, the barrels being dischargeable separately or concurrently, and the second barrel being dischargeable automatically at will for rapid fire thereof.

7. In a firearm, in combination, a main barrel for firing long-range and relatively heavy projectiles having a normal trajectory of small curvature, a second barrel for firing short-range projectiles having a normal trajectory of relatively greater curvature than the first projectiles, firing mechanism and trigger mechanism for the main barrel, and firing mechanism and trigger mechanism for the second barrel, the barrels being dischargeable separately or concurrently; the second barrel being operatively arranged and supported in the firearm adjacently to and beneath the main barrel, the bore of the second barrel converging forwardly and upwardly relatively to the main barrel, whereby the trajectory of the projectiles from the second barrel intersects upwardly the trajectory of the projectiles from the main barrel at a point remote from the muzzles of said barrels, and intersects said trajectory downwardly at a second point more remote from the muzzles of said barrels than said first point, and when the barrels are discharged concurrently providing concentrated fire from said barrels at said points of intersection.

8. In a firearm, in combination, a main barrel for firing long-range and relatively heavy projectiles having a normal trajectory of small curvature, a second barrel for firing short-range projectiles having a normal trajectory of relatively greater curvature than the first projectiles, firing mechanism and trigger mechanism for the main barrel, and firing mechanism and trigger mechanism for the second barrel, the barrels being dischargeable separately or concurrently, the second barrel being dischargeable automatically at will for rapid fire thereof; the second barrel being operatively arranged and supported in the firearm adjacently to and beneath the main barrel, the bore of the second barrel converging forwardly and upwardly relatively to the bore of the main barrel, whereby the trajectory of the projectiles from the second barrel intersects upwardly the trajectory of the projectiles from the main barrel at a point remote from the muzzles of said barrels, and intersects said trajectory downwardly at a second point more remote from the muzzles of said barrels than said first point, and when the barrels are discharged concurrently, and the second barrel automatically, providing concentrated fire from said barrels at said points of intersection.

9. In a firearm, in combination, a main barrel, a second barrel operatively arranged and supported in the firearm adjacent to and beneath the main barrel, and conductive means having an extended portion broadened at its edges interposed between said barrels extending longitudinally of the barrels for substantially the full length of the second barrel and contacting with both bar-

rels for utilizing the main barrel for disposing of heat generated in the second barrel.

10. In a firearm, in combination, a main barrel, a second barrel operatively arranged and supported in the firearm adjacent to and beneath the main barrel, and a sleeve on the second barrel having an extended portion broadened at its edges, the sleeve being interposed between said barrels and extending longitudinally of the barrels for substantially the full length of the second barrel and contacting with both barrels for utilizing the main barrel for disposing of heat generated in the second barrel.

11. In a firearm, in combination, a main barrel, a second barrel operatively arranged and supported in the firearm adjacently to the main barrel, and means interposed between said barrels for utilizing the main barrel for disposing of heat generated in the second barrel; said means consisting of a member comprising a hollow lower longitudinal portion and a longitudinal upper surface curved in cross-section, said lower portion providing a sleeve for the second barrel, and said upper surface contacting with the under surface of the main barrel and extending longitudinally of said barrel.

12. In a firearm, in combination, a main barrel, a second barrel operatively arranged and supported in the firearm adjacently to and beneath the main barrel, and means interposed between said barrels for utilizing the main barrel for disposing of heat generated in the second barrel; said means consisting of a member comprising a hollow lower longitudinal portion and a longitudinal upper surface curved in cross-section, said lower portion providing a sleeve for the second barrel, and said upper surface contacting with the under surface of the main barrel and extending longitudinally of said barrel.

13. A shoulder-arm comprising, in combination, a stock having a butt-stock portion and a chambered forestock portion; a pair of barrels spaced apart and comprising a relatively long and heavy main barrel fixedly mounted on the stock and equipped for firing long-range projectiles, and a relatively shorter and lighter rapid fire barrel equipped with mechanism for firing short-range projectiles, and supportively and rigidly connected to and located underneath said long barrel and housed within said chambered portion of the forestock, and a heat-transmitting member interposed longitudinally between and contacting with each of said barrels whereby to utilize said main barrel for disposing of heat generated in the rapid-fire barrel.

14. In a firearm, in combination, a main barrel, a second barrel operatively arranged and supported in the firearm adjacently to and beneath the main barrel, firing mechanism for the main barrel, and firing mechanism for the second barrel; the firing mechanism for the second barrel comprising a reciprocable power block and breech bolt retractable by explosion gases and projectable by spring means.

15. In a firearm, in combination, a main barrel, a second barrel operatively arranged and supported in the firearm adjacently to and beneath the main barrel, firing mechanism for the main barrel, and firing mechanism for the second barrel; the firing mechanism for the second barrel comprising a reciprocatable power-block and breech-bolt provided with an operatively arranged firing-pin, the power-block and breech-bolt being retractable by explosion gases and projectable by spring means.

16. In a firearm, in combination, a main barrel, a second barrel operatively arranged and supported in the firearm adjacently to and beneath the main barrel, firing mechanism for the main barrel, and firing mechanism for the second barrel; the firing mechanism for the second barrel comprising a reciprocatable power-block and breech-bolt provided with a spring actuated firing-pin, the power-block and breech-bolt being retractable by explosion gases and projectable by spring means.

17. In a firearm, in combination, a main barrel, a second barrel operatively arranged and supported in the firearm adjacently to and beneath the main barrel, firing mechanism and trigger mechanism for the main barrel, and firing mechanism and trigger mechanism for the second barrel; the firing mechanism for the second barrel comprising a reciprocatable power-block and breech-bolt retractable by explosion gases and projectable by spring means; the trigger mechanism for the second barrel comprising means for releasably retaining the power-block and breech-bolt in retracted position and trigger operated means co-operating with said releasable retaining means for operating the same.

18. In a firearm, in combination, a main barrel, a second barrel operatively arranged and supported in the firearm adjacently to and beneath the main barrel, firing mechanism and trigger mechanism for the main barrel, and firing mechanism and trigger mechanism for the second barrel; the firing mechanism for the second barrel comprising a reciprocatable power-block and breech-bolt retractable by explosion gases and projectable by spring means; the trigger mechanism for the second barrel comprising a catch-lever for releasably retaining the power-block and breech-bolt in retracted position and a trigger operated push-rod for operating said catch-lever.

19. In a firearm, in combination, a main

barrel, a second barrel operatively arranged and supported in the firearm adjacently to and beneath the main barrel, firing mechanism and trigger mechanism for the main barrel, and firing mechanism and trigger mechanism for the second barrel; the firing mechanism for the second barrel comprising a reciprocatable power-block, and breech-bolt provided with an operatively arranged firing-pin, the power-block and breech-bolt being retractable by explosion gases and projectable by spring means; the trigger mechanism for the second barrel comprising a catch-lever for releasably retaining the power-block and breech-bolt in retracted position and a trigger operated push-rod for operating said catch-lever.

20. In a firearm, in combination, a main barrel, a second barrel shorter than the first barrel operatively arranged and supported in the firearm adjacently to and beneath the main barrel, and a bayonet shank carried by the main barrel provided with an aperture for passage therethrough of projectiles discharged from the second barrel.

21. In a firearm, in combination, a main barrel, a second barrel shorter than the first barrel operatively arranged and supported in the firearm adjacently to and beneath the main barrel, the bore of the second barrel converging forwardly and upwardly relatively to the bore of the main barrel, and a bayonet shank carried by the main barrel provided with an aperture for passage therethrough of projectiles discharged from the second barrel.

22. A firearm comprising, in combination, a stock fitted and furnished for carrying thereon an upper barrel and its connected cartridge-placing and firing mechanism said stock having a chambered fore-stock portion; an upper main barrel provided with cartridge-placing and firing mechanism and rigidly but releasably mounted on said stock, and having the muzzle thereof extending to a position forward of said fore-stock; a second and shorter barrel provided with connected loading and firing mechanism and housed within said chambered fore-stock; and means supportively connecting said second barrel to and underneath the main barrel, whereby the main barrel is the carrier for said second barrel and mechanism, and the muzzle of said second barrel being in position for the gases discharged therefrom to drive forward gases at the muzzle of the main barrel for thereby producing an air current through the bore of said main barrel, the bore of the main barrel being open at breech and muzzle at the time of discharge of the second barrel.

23. A firearm comprising, in combination, a stock fitted and furnished for carrying thereon an upper barrel and its connected cartridge-placing and firing mechanism, said stock having a chambered fore-stock portion; an upper main barrel provided with cartridge-placing and firing mechanism and mounted on said stock, and having the muzzle thereof extending to a position forward of said fore-stock; a second and shorter barrel and connected loading and firing mechanism therefor, housed within said chambered fore-stock, the bore of the main barrel being open at breech and muzzle at the time of discharge of the second barrel, and located below said main barrel and forward of the said loading and firing mechanism of the main barrel; and, means for transmitting heat from said second barrel to the main barrel, the muzzle of said second barrel being in position for the gases discharged therefrom to displace by driving forward the gases at the muzzle of the main barrel for thereby producing an air current through the bore of said main barrel, and thus convey away heat transmitted from the second barrel.

JOHN D. PEDERSEN.

Witnesses:
HARRY WAGNER,
C. J. PEDERSEN.