June 21, 1949. S. WEISS 2,473,555

BREECH-LOADING MORTAR WITH OBTURATOR CASE

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Fig. 1.

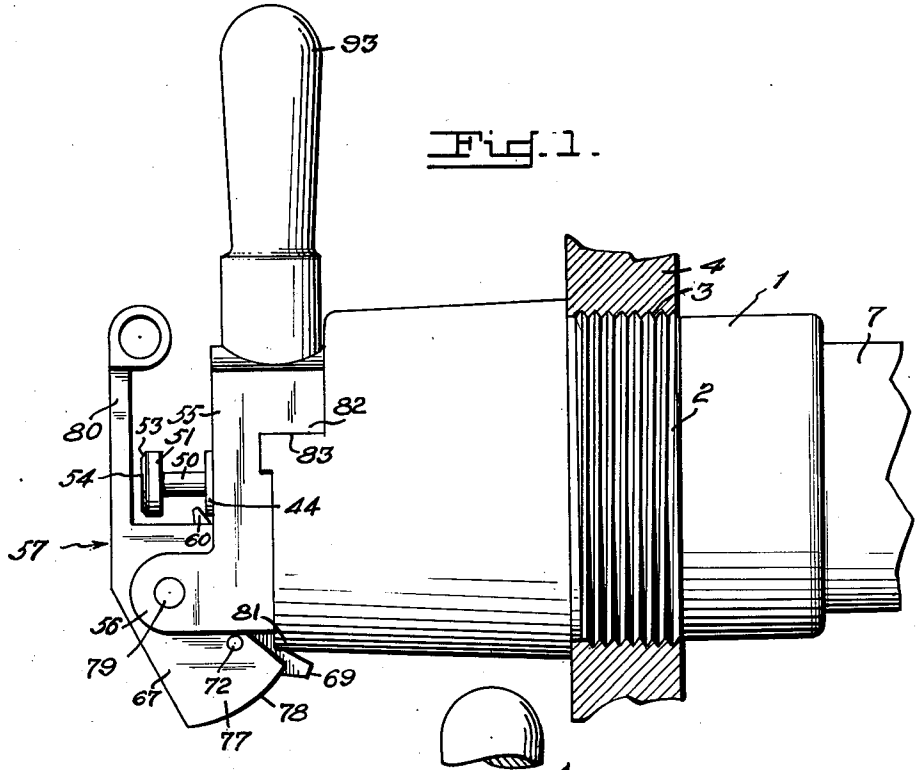


Fig. 2.

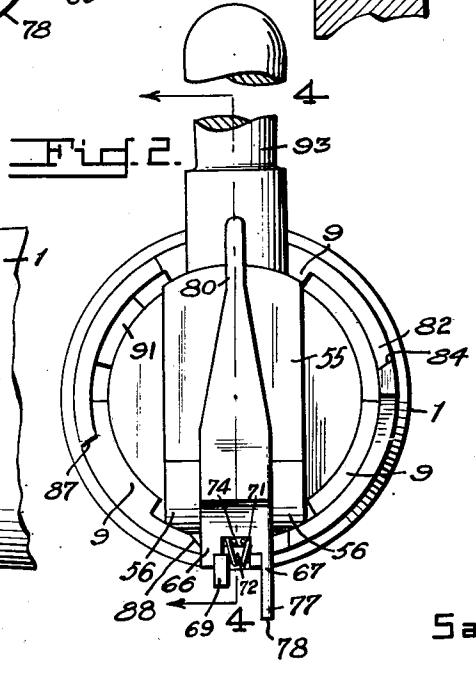
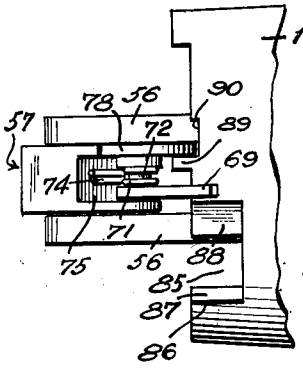


Fig. 3.



Inventor

Saul Weiss

By J. H. Church, W. C. Thibodeau & Les Ross
Attorneys

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Fig. 4.

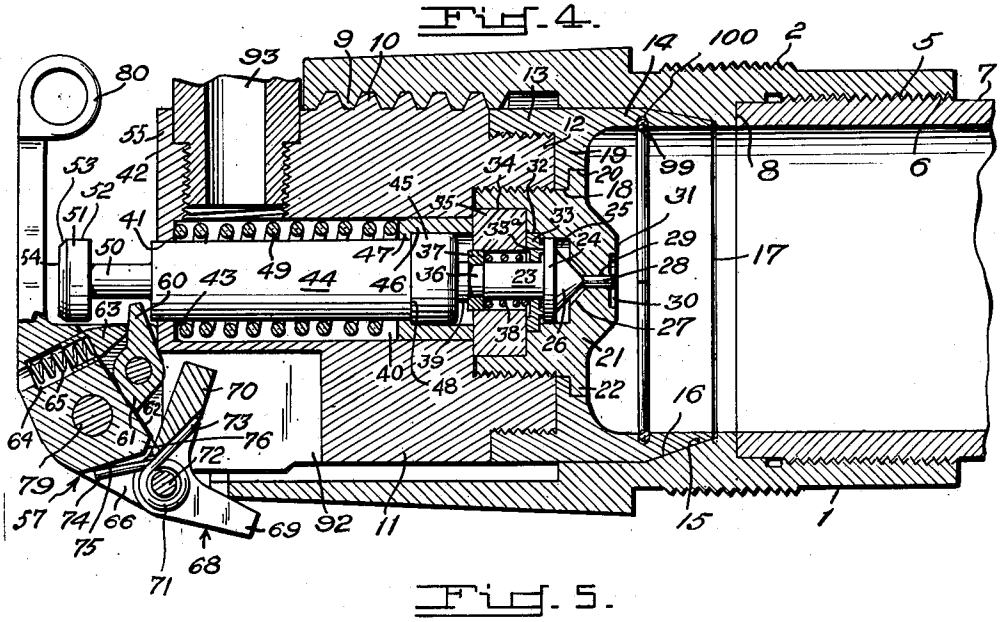


Fig. 5.

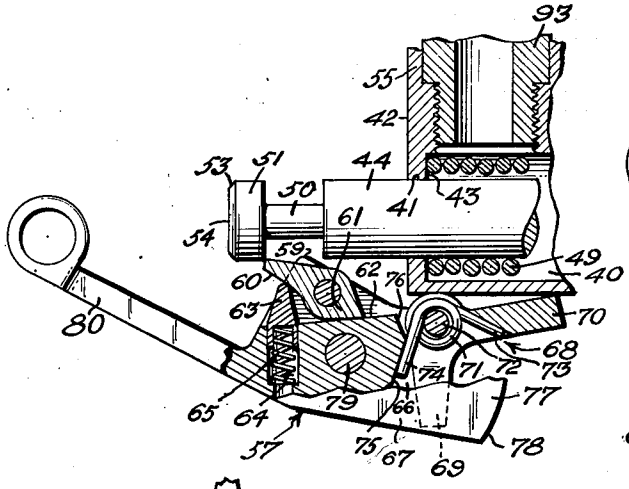
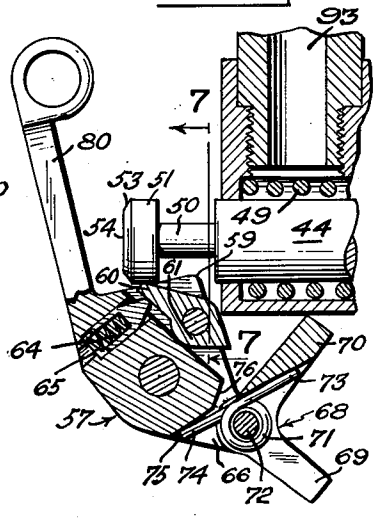


Fig. 6.



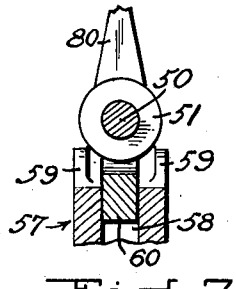


Fig. 7.

Inventor

Saul Weiss

By J. H. Church, W. E. Thibodeau & Leo Ross

Attorneys

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Fig. 8.

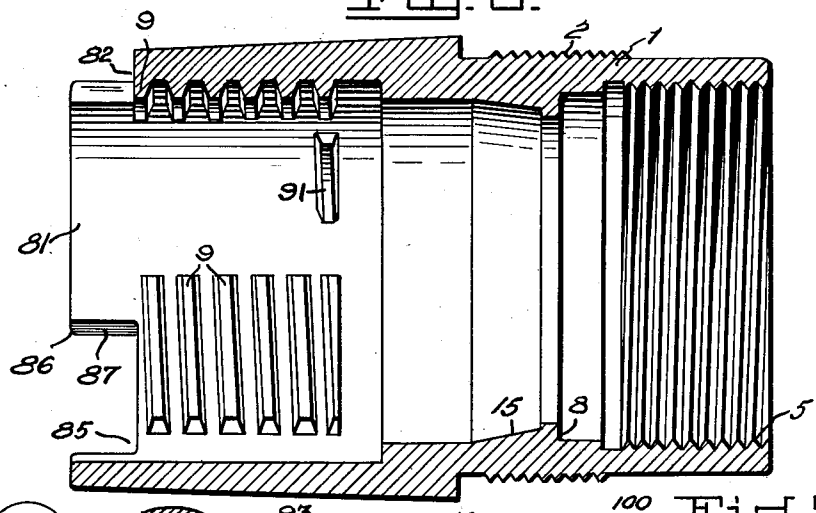


Fig. 9.

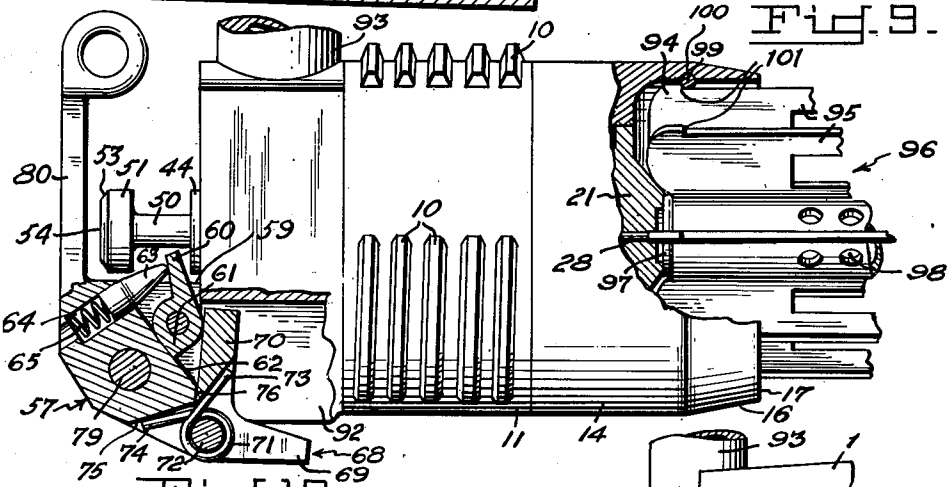


Fig. 10.

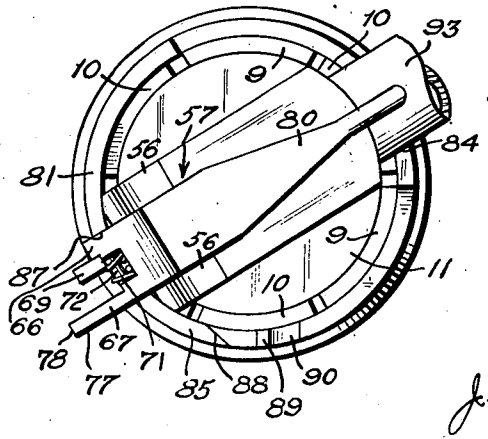
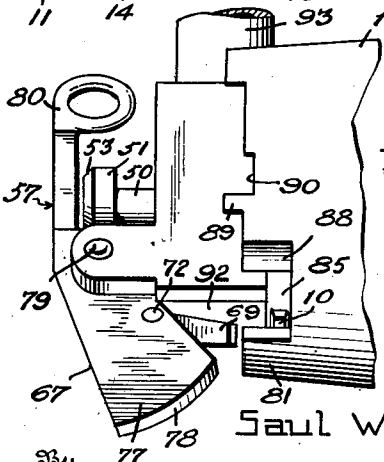


Fig. 11.



Inventor

Saul Weiss

By J. H. Church, W. E. Thibodeau & Leo Ross

Attorneys

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2,473,555

UNITED STATES PATENT OFFICE

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BREECH-LOADING MORTAR WITH OBTURATOR CASE

Saul Weiss, Washington, D. C., assignor to the United States of America as represented by the Secretary of War

Application July 24, 1947, Serial No. 763,407

11 Claims. (Cl. 89—26)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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The invention described in the following specification and claims may be manufactured and used by or for the Government for governmental purposes without the payment to me of any royalty thereon.

The invention relates to an improved mortar to enable use of standard types of mortar ammunition in a breech loading mortar mounted for firing from an enclosed space such as a tank, pillbox, etc. to protect the gunner from exposure to enemy fire. A breech loading mortar must have obturating means for sealing the breech to prevent escape of the gases of the propellant of the mortar round. The particularly novel and useful features of the improved mortar are the obturating means and the mounting means therefor. These features comprise an obturator case, a breechblock and a breech ring which are so designed that the round is mounted in the case which is attached to the block. The round is chambered and the breech is closed and sealed by the single operation of seating the block in the ring. The block is provided with improved firing means and trigger means for operating the firing means. Since the round is mounted in the case on the block prior to seating of the block in the ring and hence prior to chambering the round, the trigger means has a safety latch preventing actuation of the trigger before the round is chambered. This latch is automatically released to allow operation of the trigger when the block is seated and the round chambered. The trigger means also has a latch to engage the block to insure sealing of the breech on firing. The structure is such that the mortar can not be fired unless the block is disposed to seal the breech, and when it is so disposed and the trigger fires the mortar its latch retains the block to maintain the seal.

While there has been illustrated in the drawings and hereinafter fully described one specific embodiment of the invention, it is to be distinctly understood that the invention is not considered to be limited to said specific embodiment, and that its scope is defined by the claims appended hereto.

In the drawings:

Fig. 1 is a side elevation of the improved mortar and section of the mount, parts of the barrel and mount being broken away;

Fig. 2 is a rear end elevation;

Fig. 3 is a fragmentary bottom plan;

Fig. 4 is a vertical section on the line 4—4 of Fig. 2, in the direction of the arrows;

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Fig. 5 is a fragmentary view similar to Fig. 4 showing the trigger and bolt in cocking position;

Fig. 6 is a view similar to Fig. 5, showing the trigger returning to normal position;

Fig. 7 is a vertical section on the line 7—7 of Fig. 6, in the direction of the arrows;

Fig. 8 is a longitudinal, axial, vertical section of the breech ring, the breechblock and barrel removed;

Fig. 9 is a side elevation, partly in section and parts broken away, of the breechblock removed from the breech ring, the case mounted on the block and a projectile mounted therein;

Fig. 10 is a rear elevation, similar to Fig. 2, showing the breechblock inserted into the breech ring, and before it has been rotated to seat in the ring;

Fig. 11 is a broken plan, similar to Fig. 3, showing the parts as they are disposed in Fig. 10.

As illustrated in the drawings, the improved mortar has a breech ring 1 provided with suitable exterior threads 2 meshing with threads 3 of a suitable mount 4, as the wall of a tank for example, and interior threads 5 in its anterior portion meshing with exterior threads 6 on a barrel 7 seated in such portion, its rear end bearing on an interior peripheral flange 8 of ring 1. The ring 1 is provided in its posterior portion with interrupted threads 9 meshing with interrupted threads 10 on a breechblock 11. The breechblock 11 has a reduced portion 12 on which is threaded a sleeve 13 of an obturator case 14 seated in the breech ring 1 between breechblock 11 and barrel 7. It will be noted that tapered interior and exterior surfaces 15 and 16 are provided for ring 1 and case 14, respectively, to effect a gas-tight joint when the case 14 is seated, and that the forward end 17 of case 14 is slightly posterior flange 8. The case 14 has an axial opening 18 in its rear wall 19 and a concentric socket 20 forwardly of opening 18. A bushing 21 is seated in opening 18 with a peripheral flange 22 seated in socket 20, and is threaded into the reduced portion 12 of block 11. The bushing 21 has slidably mounted therein a firing pin 23 provided with a flange 24 slidable in a bore 25 in bushing 21, and a frusto-conical head 26 intruded into a frusto-conical socket 27 in bushing 21. The reduced forward portion 28 of the pin 23 slidable in bore 27 of bushing 21 is intruded into an axial socket 30 in the forward face 31 of bushing 21. The bushing 21 has a socket 32 immediately to the rear of and concentric with bore 25 in which is seated

a stop washer 33 about pin 23 and provided on its front face with a seating ring 33a bearing on flange 24 when pin 23 is retracted. The bushing 21 has a socket 34 immediately to the rear of and concentric with the socket 32, in which is seated a stop ring 35 about and spaced radially from pin 23. The pin 23 has a peripheral groove 36 in which is seated a lock ring 37, comprising two portions, and slidable in ring 35. A coil spring 38 about pin 23 is confined between washer 33 and ring 37. The rear end 39 of pin 23 protrudes from the rear edge of ring 35 into a bore 40, in the breechlock 11, having a reduced portion 41 at the rear face 42 of block 11, to form a peripheral shoulder 43. Slidable in reduced portion 41 is a bolt 44 having on its forward end an enlarged portion 45 received in a stop collar 46 slidable in the bore 40. The collar 46 has an inwardly turned flange 47 on its rear end to engage the peripheral shoulder 43 formed by enlarged portion 45. A coil spring 49 about bolt 44 is confined between shoulder 43 and flange 47 to bias bolt 44 forwardly. It will be noted (Fig. 4) that rear end 39, of pin 23 biased rearwardly by spring 38, normally bears against the front end of enlarged portion 45 of bolt 44 to press shoulder 48 against flange 47 and against spring 49 to maintain bolt 44 in normal position. When so disposed, the bolt 44 extends rearward beyond the rear face 42 of block 11, and has a stem 50 projecting rearwardly and having a head 51 having a cylindrical periphery 52 and a circumferential bevel 53 on its rear face 54.

The portions of the breechblock 11 above mentioned, viz. the portion provided with threads 10 and the reduced portion 12, are cylindrical to conform to the cylindrical interior of the breech ring 1. The block 11 has a rear portion 55 having parallelly disposed plane sides and convex top and bottom ends. Projecting rearwardly from the lower end of portion 55 there is a pair of lugs 56 in which is pivoted a trigger 57. The trigger 57 is provided on its forward end with a slot 58 forming lateral walls 59 in which is pivoted a finger 60 having a tail 61 pressed into engagement with the bottom 62 of slot 58 by a plunger 63 slidable in socket 64 in trigger 57 and biased against finger 60 by spring 65. The lower end of the trigger 57 is bifurcated to form legs 66 and 67 between which there is pivoted a safety latch 68 L-shaped to provide an operating finger 69 and a bifurcated head 70. An operating spring 71 is coiled about pintle 72 of latch 68 and has its loop end 73 received in head 70 and its free ends 74 bearing on surface 75 of trigger 57 between legs 66 and 67. Trigger 57 is cut away to provide a surface 76 intermediate bottom 62 of slot 58 and surface 75 (Fig. 9). Leg 67 projects downwardly to form a locking slide 77 having an arcuate edge 78 concentric with the pivot pin 79 of trigger 57. Trigger 57 has a handle 80. The breech ring 1 has a portion 81 projecting rearwardly from its portion having the interrupted threads 9 (see Figures 8 and 10). The portion 81 is cut away at the upper side of ring 1 to form an arcuate recess 82 defined at its right end, as viewed in Figs. 1 and 2, by a shoulder 83 having a plane face 84. Portion 81 is cut away at the lower side of ring 1 to form an arcuate recess 85 defined at its left end, as viewed in Figs. 3 and 10, by shoulder 86 having a plane face 87. The faces 84 and 87 lie in parallel planes symmetrically disposed on opposite sides of the longitudinal axis of ring 1. The recess 85 has, at its right end as viewed

in Figs. 3 and 10, a cam surface 88 sloping rearwardly to the rear edge of portion 81. Spaced to the right (Fig. 10) of cam 88 there is a rearwardly projecting lug 89 on the rear edge of portion 81, and to the right of lug 89 there is a shallow slot 90 on the rear edge of portion 81. It will be noted (Figs. 2 and 8) that the breech ring 1 has a lug 91 on the inner surface of ring 1 in one of the interruptions of the threads 9 registering with threads 9.

The breechblock 11 has in its bottom at the rear end a recess 92 to receive the head 70 of the safety latch 68, and is provided with an operating handle 93 mounted in the top of portion 55.

It will be noted (Figs. 4 and 9) that the forward surface of wall 19 of the case 14 and the front end of the bushing 21 are configured to receive the rear ends 94 of the fins 95 of a projectile 96 about the bushing 21, the primer 97 of the propellant cartridge 98 being seated on the face of the bushing 21. The projectile 96 is retained in the case 14 by a resilient split ring 99 in a peripheral groove 100 in case 14 which yieldingly engages the fins 95 being seated against shoulders 101 on the fins 95 rearward of ring 37. The assembling of the parts will now be explained. The barrel 7 is threaded into the breech ring 1 which is threaded into the mount 4. The breechblock 11 with operating handle 93 mounted therein is then equipped with bolt 44 and firing mechanism, trigger 57 and its associated mechanism, and the obturator case 14. It will be noted (Fig. 4) that the bolt 44 and its head 51 are co-axial and of the same diameter, fitting nicely through reduced portion 41 of bore 40 in breechblock 11. These parts are assembled by passing head 51 and bolt 44 through the collar 46 until its flange 47 seats against shoulder 48 of enlarged portion 45 of bolt 44. The spring 49 is placed about bolt 44, its forward end seating against collar 46. The parts are then mounted in the breechblock 11 by passing them rearwardly through bore 40, the rear end of bolt 44, its stem 50 and head 51 passing through reduced portion 41, the rear end of spring 49 seating on shoulder 43, and collar 46 being positioned at the forward end of bore 40. The firing mechanism, associated with bolt 44, is assembled and mounted in breechblock 11 as follows. The washer 33 is placed on firing pin 23 against flange 24. The spring 38 is placed about pin 23 and the two portions of ring 37 are seated in groove 36 in pin 23 to confine spring 38 between washer 33 and ring 37. The parts thus assembled are then inserted forwardly into the bushing 21. The stop ring 35 is passed over ring 37 and spring 38 to seat in socket 34 of the bushing 21. The firing mechanism is now assembled preparatory to installation in breechblock 11, before which the obturator case 14 must be mounted on breechblock 11. The sleeve 13 of the case 14 is threaded on the reduced portion 12 of block 11. The bushing 21 is then threaded into reduced portion 12 and seated in opening 18 and socket 20 in wall 19 of the case 14, the assembled parts being disposed as shown in Fig. 4.

The trigger 57 and its associated mechanism are assembled before mounting on the breechblock 11. The spring 65 and plunger 63 are mounted in socket 64 in the trigger 57, and finger 60 is pivoted on walk 59 and in slot 58. Safety latch 68 is then mounted in the bifurcated lower end of the trigger 57, its bifurcated head 70 pro-

jecting upwardly and its operating finger 69 projecting forwardly, the spring 71 being received about pintle 72 and its ends 73 and 74 bearing against head 70 and surface 75 of the trigger 57. The assembled parts are then mounted on the breechblock 11 by pivoting trigger 57 on pintle pin 79 in lugs 56 in portion 55 of breechblock 11.

It will be noted (Fig. 9) that when the trigger 57 has been mounted on the breechblock 11, as above described, the parts are so relatively disposed that the safety latch 68 is intruded into the recess 92 in block 11 and its head 70 urged rearwardly by spring 71 bears on surface 76, its upper end slightly spaced from the upper end of recess 92, and lateral walls 59 of trigger 57 bearing against the rear face 42 of the block 11. It is obvious that rocking of trigger 57 on its pin 79, beyond a very slight innocuous degree, is prevented by contact of head 70 with top of recess 92.

The use and operation of the mortar will now be explained. The projectile 96 is mounted in the case 14 by passing the fins 95 of the projectile 96 rearwardly sufficiently to distend split ring 99 over the rear ends 94 and engage against shoulders 101 on fins 95. When the projectile 96 is so mounted in case 14, the primer 97 is seated against the face 31 of the bushing 21 concentric with socket 30 and forward portion 28 of firing pin 23. Actuation of the firing pin 23 to fire the primer 97 is effectually prevented by the safety latch 68, as above described, after the projectile 96 has been mounted and before the breechblock 11 has been seated in breech ring 1.

When the projectile 96 is to be fired from the mortar, the complete unit assembled as above described and comprising the breechblock 11, case 14 and projectile 96 is inserted forwardly into ring 1. In order to register the threads 10 on block 11 with the interruptions of threads 9 in ring 1 and permit axial displacement of block 11, the block 11 is rotated clockwise (Fig. 10) to dispose handle 93 against surface 84 and leg 66 of trigger 57 against surface 87. The above described unit is displaced axially until the forward edge of threads 10 bear against lug 91 in the interruption of threads 9 in ring 1, thereby registering threads 9 and 10. The block 11 is then rotated counterclockwise by its handle 93, moving from its position of Fig. 10 to its position of Fig. 2, and effecting the following results. Meshing threads 9 and 10 cause further axial displacement of block 11 relative to ring 1. The operative finger 69 of the safety latch 68 is intruded into recess 85 in portion 81 of ring 1 and is cammed downwardly by cam surface 88 so that its forward end is engaged below the portion 81 of ring 1, thereby disposing latch 68 as shown in Fig. 4, tensioning spring 71 to bias trigger 57 against portion 55 of block 11. In this position, latch 68 is disposed to release trigger 57 for firing. It will be noted that trigger 57 is not released until block 11 is properly seated in ring 1. Due to the correspondingly tapered interior surface 15 of ring 1 and exterior surface 16 of case 14, the axial displacement by action of threads 9 and 10 causes case 14 to spiral into a gas-tight sealed seating in ring 1.

When the block 11 and case 14 are disposed, as above described, the trigger 57 is conditioned for firing the projectile 96. It will be noted (Figs. 1 and 3) that the locking slide 77 on the lower end of leg 67 of the trigger 57 is so disposed that when the trigger 57 is rocked to fire the projectile 76, the slide 77 can rise along the lug 89 and into the slot 90, thereby locking the block 11 against clockwise rotation to maintain the above described gas tight seal of case 14. Also it is noted that slide 77 cannot rise until block 11 is fully rotated to seal case 14, thus preventing functioning of trigger 57 to fire the projectile 96 if the case 14 is not properly sealed. To fire the projectile 96, the trigger 57 is rocked by pulling its handle 80 rearwardly, causing finger 60 to engage head 51 of bolt 44, retracting bolt 44, compressing spring 49, until rotation of trigger 57 moves finger 60 downwardly off of head 51 (Fig. 5) thereby releasing bolt 44 which is projected forwardly by expanding spring 49. While collar 46 stops at the forward end of bore 40, striking stop ring 35, the bolt 44 moves by inertia through collar 46 to impact pin 23 compressing its spring 38 and intruding its tip 28 into the primer 97 firing the projectile 96.

Rocking of the trigger 57 to fire the projectile 96 (Fig. 5) tensions spring 71 of safety latch 68 which returns trigger 57 to normal position when trigger 57 is released after firing. Head 51 of bolt 44 cams finger 60 downwardly to permit it to pass head 51 (Fig. 6) and lateral walls 59 of trigger 57, being sufficiently laterally spaced, pass head 51 (Fig. 7).

Having described the invention, I claim:

1. In a mortar, the combination of a breech ring having an anterior barrel-receiving portion, a posterior breech block-receiving portion and an intermediate tapered portion; a barrel mounted in said anterior portion; a breechblock removably mounted in said posterior portion; and an obturator case mounted on said block, having a tapered exterior surface, and seated in said intermediate portion.

2. In a mortar, the combination of a breech ring having a cylindrical portion provided with interior interrupted threads, and a tapered portion provided with a smooth interior surface; a barrel mounted in said ring; a breechblock having a cylindrical portion provided with exterior interrupted threads; and an obturator case mounted on said block, having a tapered smooth exterior surface, and seated in said tapered portion when the ring and block threads mesh.

3. In a mortar, the combination of a breech ring having an anterior barrel-receiving portion, a posterior breechblock-receiving portion and an intermediate tapered portion; a barrel mounted in said anterior portion; a breechblock removably mounted in said posterior portion; an obturator case mounted on said block, having a tapered exterior surface, seated in said intermediate portion and provided with means for detachably mounting a projectile in said case; and means in said block and said case for firing said projectile from the mortar.

4. In a mortar, the combination of a breech ring, having interior threads and a portion having a smooth interior surface tapering inwardly forwardly; a breechblock threaded on the threads of said ring; and an obturator case mounted on said block and having a smooth exterior surface tapering inwardly forwardly, said case being seated in said portion of said ring, and said tapered surfaces being juxtaposed to effect a gas-tight joint between said ring and said case by the clamping effect produced by the threaded engagement of said ring and block when the block and case are mounted in said ring.

5. In a mortar, the combination of a breech ring having interior threads at its forward and rear ends and a portion intermediate the forward and rear threads having a smooth interior

surface tapering inwardly forwardly; a barrel threaded on the forward threads of said ring; a breechblock threaded on the rear threads of said ring; an obturator case mounted on said block and having a smooth exterior surface tapering inwardly forwardly; and means in said case for mounting a projectile in said case, said case being seated in said intermediate portion of said ring, said projectile being chambered in said barrel, and said tapered surfaces being juxtaposed to effect a gas-tight joint between said ring and said case by the clamping effect produced by the threaded engagement of said ring and block when the block and case are mounted in said ring.

6. In a mortar, the combination of a breech ring; a barrel mounted in said ring; a breechblock mountable in said ring and having means for so mounting a primed mortar round on said block that the round is chambered in said barrel when the block is mounted in said ring; firing means in said block including a striker disposed closely adjacent the primer of the round when the round is mounted in the block; a trigger pivoted on said block for operating said striker to impact the primer to fire the round; and a safety latch pivoted on said trigger and engaging said block to immobilize the trigger on the block to prevent firing of the round before the block is mounted in said ring, said latch being engaged by said ring and releasing the trigger when the block is so mounted in the ring as to chamber the round.

7. In a mortar, the combination of a block provided with means for mounting the block in the breech of the mortar; means mounted on said block for sealing the breech when the block is so mounted; means, in said sealing means, for mounting a mortar round on said block and chambering said round when the block is mounted; means in said block and said sealing means for firing said round, the round being in position for firing relative to said firing means when it is mounted in said sealing means; and safety means for immobilizing said firing means so long as the block, sealing means and round are unmounted, said safety means being inoperative when the block and sealing means are mounted and the round is chambered.

8. In a mortar, the combination of a block provided with means for removably mounting the block in the breech of the mortar; means in said block for firing a round in the mortar; a trigger for operating said firing means pivoted on said block; and a safety latch pivoted on said trigger and comprising a head biased to engage said block to immobilize said trigger when said block is removed from the mortar, and an operating finger connected to said head, engaging the mortar breech when said block is mounted therein, and disengaging said head from said block to release said trigger.

9. In a mortar, the combination of a breech ring; a breechblock removably mounted therein; firing means in said block; a manually operated trigger for said means pivoted on said block; a pintle pin on said trigger; a safety latch pivoted on said pin and comprising a head engaging said block to immobilize said trigger when said block is removed from said ring, and an operating finger connected to said head engaging said ring when said block is mounted in said ring to disengage said head from said block to release said trigger; and coil spring on said pin and having two ends resiliently engaging said trigger and said latch, respectively, and biasing said latch to engage said head with said block and said finger with said ring, and biasing said trigger to normal position for manual operation for firing.

10. In a mortar, the combination of a breech ring having interior threads and an exterior notch; a breechblock threaded on the threads of said ring; an obturator case mounted on said block, said case being seated in said ring to effect a gas-tight joint between said ring and said case by the clamping effect produced by the threaded engagement of said ring and block when the block and case are mounted in said ring; and a latch pivoted on said block for locking said block to said ring, said latch being moved by said block into position to be swung into said notch when said case is seated.

11. In a mortar, the combination of a breech ring having interior threads and an exterior notch; a breechblock threaded on the threads of said ring; an obturator case mounted on said block, said case being seated in said ring to effect a gas-tight joint between said ring and said case by the clamping effect produced by the threaded engagement of said ring and block when the block and case are mounted in said ring; firing means in said block and case; a trigger for said firing means pivoted on said block; a latch on said trigger for locking said block to said ring, said latch being moved by said block into position to permit said trigger to be swung to move said latch into said notch, when said case is seated, and said trigger being inoperative until said latch is so moved.

SAUL WEISS.

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