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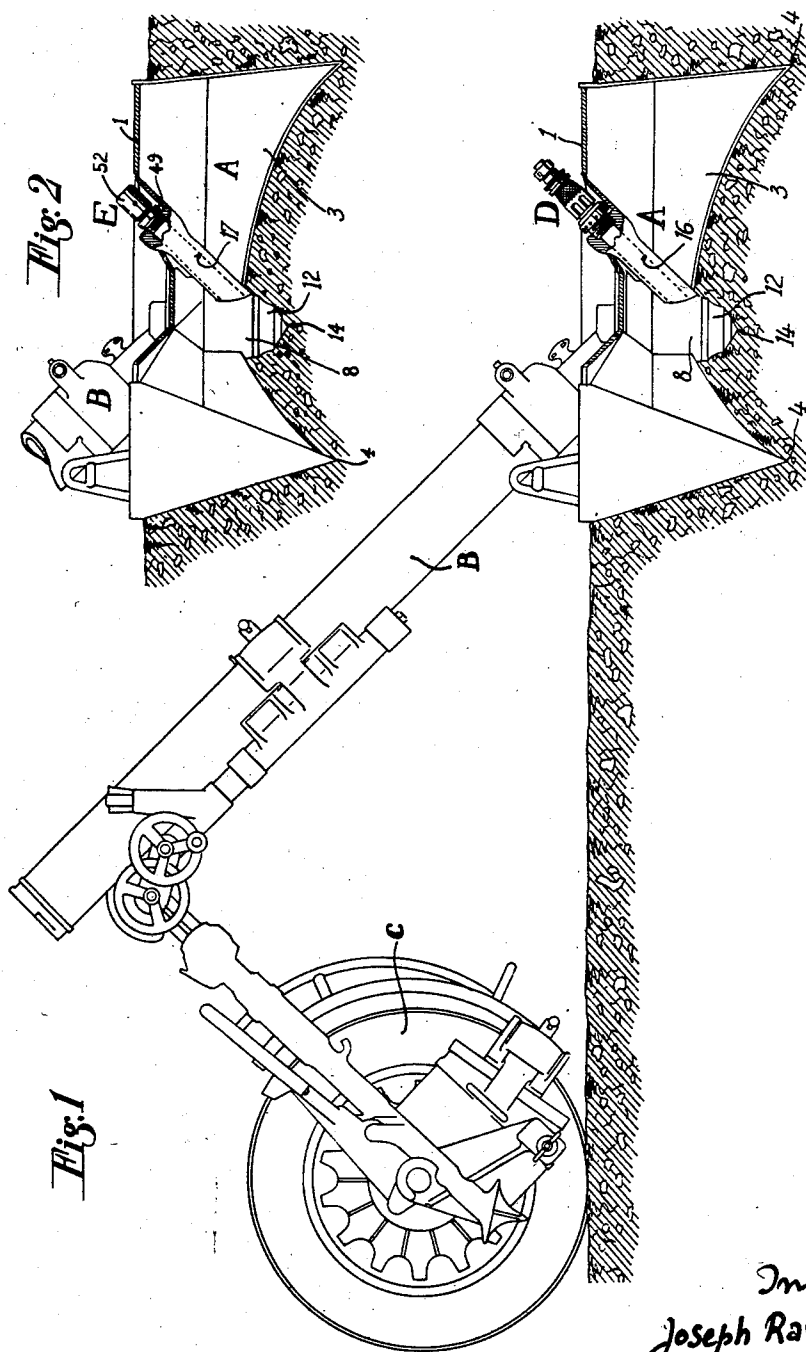
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BASE PLATE FOR MORTARS AND LIKE APPARATUSES

Filed Dec. 23, 1953

4 Sheets-Sheet 1



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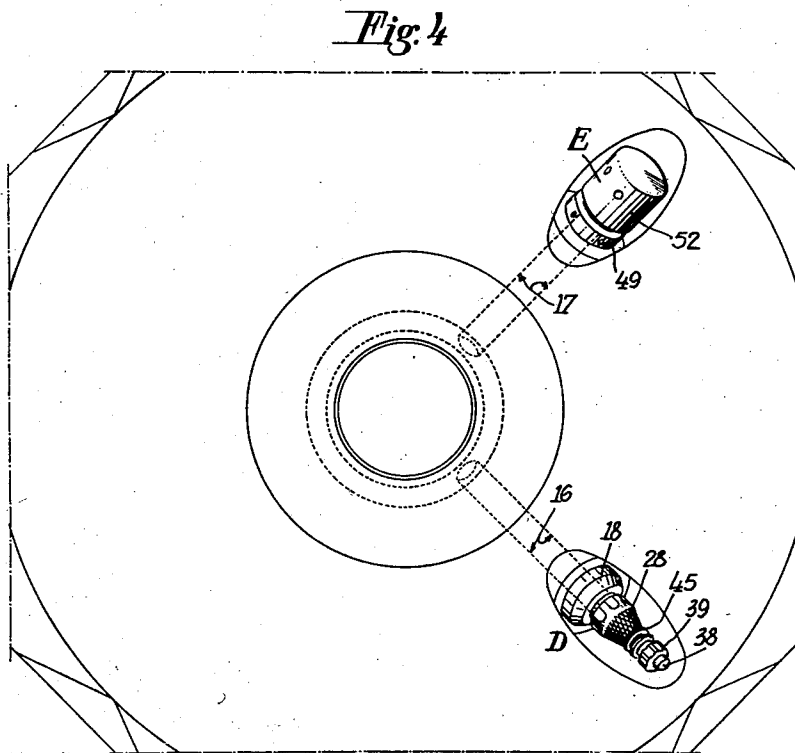
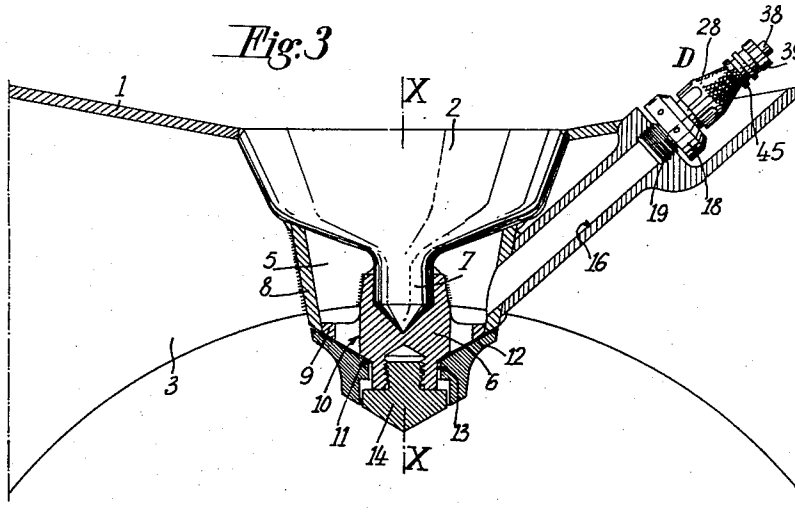
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BASE PLATE FOR MORTARS AND LIKE APPARATUSES

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BASE PLATE FOR MORTARS AND LIKE APPARATUSES

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Fig. 5

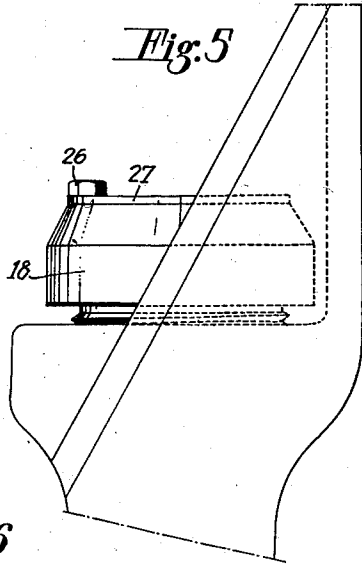


Fig. 6

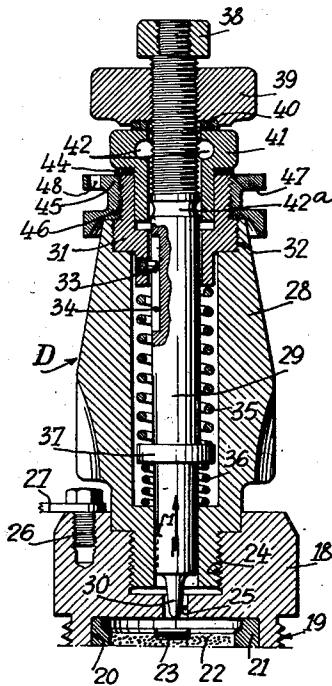
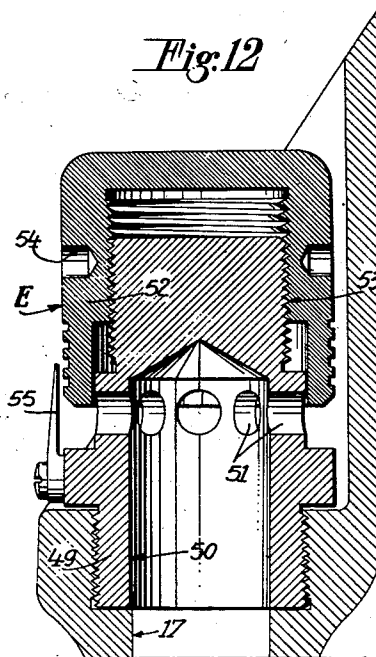


Fig. 12



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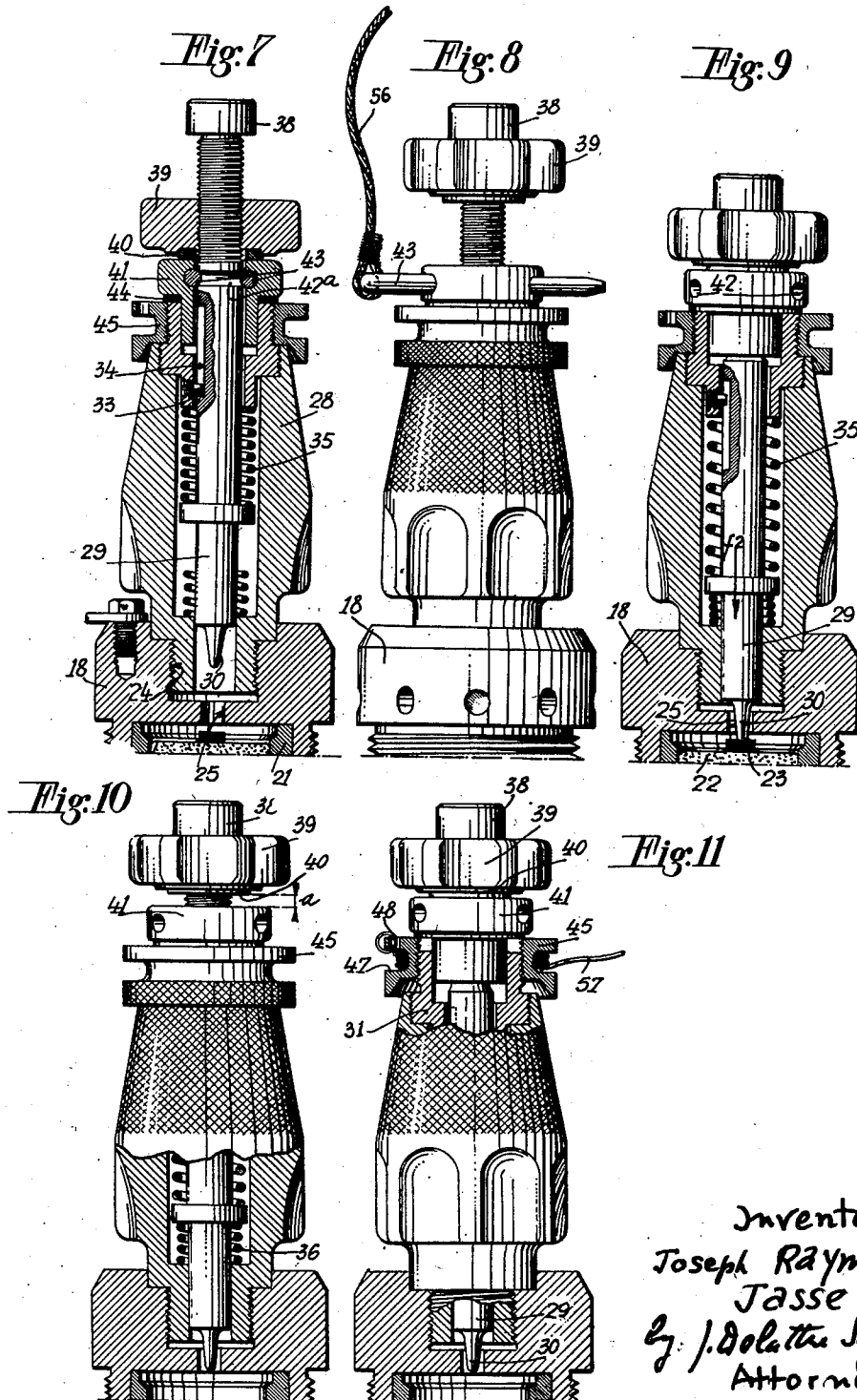
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BASE PLATE FOR MORTARS AND LIKE APPARATUSES

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4 Sheets-Sheet 4



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## BASE PLATE FOR MORTARS AND LIKE APPARATUSES

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4 Claims. (Cl. 89—37)

The introduction of radar position determining methods in warfare has resulted in tremendous progress in the location or spotting of artillery sites and it is now essential to move artillery very rapidly from one position to another. This is particularly necessary in the case of infantry mortars which usually include a large base plate that is used in anchoring the mortar to the ground.

The present invention has for object to provide an improved base plate for a mortar or similar apparatus, this plate being so designed as to be readily extracted from the ground within an extremely short space of time after the last projectile has been fired, this being possible however deeply this plate was embedded in the ground.

The invention has more particularly for object to provide a base plate which comprises in combination at least one member which is movable relative to the body of the plate and is adapted to offer a relatively large surface of contact with the ground, a powder charge and a firing device by means of which it is possible, as a result of the pressure of the gases incident to the firing of this powder charge by means of the firing device, to cause a displacement of said member with respect to the body of the base plate.

With this arrangement, it is clear that due to the fact that the movable member bears against the ground, it is merely sufficient to fire the powder charge to obtain an upward displacement of the body of the base plate and hence the extraction of the latter from the ground in an automatic manner.

Other features and advantages of the invention will appear from the ensuing description with reference to the accompanying drawings given merely by way of example and in which:

Fig. 1 is an elevational view of a mortar which is loaded through the muzzle and is provided with an improved base plate according to the invention, this plate being shown partially in section so as to illustrate the powder charge and firing device,

Fig. 2 is a similar view of the base plate showing an auxiliary venting device by means of which it is possible to modify the effect of the explosion of the powder charge,

Fig. 3 is a sectional view, on a larger scale, of the base plate, the section being taken through the passageway which leads to the powder charge and firing device,

Fig. 4 is a plan view of the base plate,

Fig. 5 is a fragmentary elevational view showing the head of the powder charge and firing device, this head being provided with a shutter adapted to close the opening therein, when the firing mechanism has been removed.

Fig. 6 is a longitudinal sectional view of said firing mechanism, in its inoperative position, in place on the head, the shutter of this head being shown moved back,

Figs. 7 to 11 are similar longitudinal sectional views or elevational views of the same firing mechanism shown in its different operational positions, and

Fig. 12 is a longitudinal sectional view, on a large scale, of the auxiliary adjustable venting device.

According to the embodiment illustrated in the draw-

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ings, the base plate A (Figs. 1 and 2) is adapted to receive the rearward thrust of the tube B of a mortar or similar apparatus which is supported at the forward end on a carriage C. The tube B is loaded through the mouth and is supported, by means of a swivel or like means as known per se, on the base plate A.

This base plate A comprises a body constituted by a rigid assembly and a member movable on said body. The body comprises an upper panel 1 integral with a central core or boss 2 which has an axis XX (Fig. 3) and is adapted to be at least substantially vertical when the plate is normally supported by or embedded in the ground. The panel 1 and the boss 2 are integral with webs or fins 3 or other anchoring members, these webs forming pointed ends 4 which aid their insertion in the ground.

An annular chamber 5 is provided under the boss 2, between the latter, a member 6 fitted on an extension 7 of the boss 2 and a ring 8, which is fixed for example by welding to this boss, the webs 3 and to a flange 9 on the member 6. In this flange 9 are provided apertures 10 through which the chamber 5 communicates with the outer conical surface 11 of the flange. These apertures 10 may be closed by means of the aforesaid members movable on the body just described. Said movable member 12 is constituted by a ring 12 forming a valve mounted on a cylindrical extension 13 of the member 6. The displacement of the movable member or ring 12 in the direction of the axis XX is limited by an abutment screw 14 which is screwed into the end of the member 6. This screw also forms a central point for insertion in the ground, the conical face of this point extends along the member 12 the outer downwardly-directed face of which is sufficiently large to provide a good bearing or support surface on the ground.

As will be understood, when the base plate is embedded in the ground, the member 12 rests on the latter, is urged against the conical face 11 of the member 6 and closes the apertures 10 so that the chamber 5 is airtight.

Two passageways 16 and 17 are connected to this chamber and are directed in an upwardly inclined direction. The passageway 16 leads to a powder charge and firing device D and the passageway 17 leads to an adjustable venting device E.

The device D (Figs. 5, 6 and 7 to 11) comprises a head 18 adapted to be fixed by a threaded portion 19 or other means in the end of the passageway 16. This head includes on its lower inwardly directed face, a recess 20 adapted to receive a cartridge 21 containing a powder charge 22 and a detonator 23. On its upper face the head 18 includes a tapped hole 24 for fixing the removable firing mechanism to the head. The hole 24 is prolonged by a firing orifice 25.

Pivoted to the head by a screw 26 or other means is a shutter 27 which is adapted to close the hole 24 when the firing mechanism is not in use. Fig. 5 shows the shutter 27 in position and in Fig. 6 this shutter has been thrown back to make way for the firing mechanism.

This mechanism comprises a body 28 in which is movable in the longitudinal direction a firing pin including a shank or rod 29 and a point 30. This shank is guided in the body 28 by a member 31 screwed at 32 in the latter. This member 31 carries a screw 33 which engages a longitudinally extending slot 34 provided in the shank of the firing pin. The latter is normally maintained in the inoperative position shown in Fig. 6 so that its point 30 is no more than flush with or even slightly retracted from the lower end of the orifice 25 in the head 18. To this end, a set of springs comprising a main spring 35 and an auxiliary spring 26 are disposed on either side of and bear against a flange 37 provided on the firing pin.

For purposes of loading the firing pin, the rear or up-

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per portion of the latter is threaded and at the end there is provided a fixed abutment 38. On the threaded portion is screwed a nut 39 which bears, through an anti-friction washer 40, against a locking member 41. This member is provided with two parallel apertures 42 in which may be inserted a locking pin 43 in the form of a fork when an annular groove 42<sup>a</sup>, provided on the firing pin shank, is positioned in front of these holes (Figs. 7 and 8).

Normally the locking member 41 rests through an anti-friction washer 44 on the upper end of the tapped hole of an auxiliary firing pin withdrawing nut 45 which is provided with a large pitch thread 46 and threadedly engages an extension of the guide member 31. The nut 45 includes an annular recess or groove 47 round which a cord or other flexible means 57 may be wound (Fig. 11). The end of this cord may be secured to this nut 45 which is provided with a hole 48 for this purpose.

The auxiliary venting device E, which is disposed at the end of the other passageway 17, comprises a venting body 49 fixed in the end of the passageway 17. This body is provided with a blind aperture 50 which communicates directly with the passageway 17 and with the exterior through a series of radial venting apertures 51. These apertures may be totally or partly covered or masked. Thus the cross-sectional area of these venting apertures may be adjusted. For this purpose there is provided a cap 52 screwed at 53 on a threaded portion of the venting body 49. For purposes of rotating the cap 52, the latter is provided with blind apertures 54 in which a key may be engaged. The adjustment obtained or setting may be read off a scale marked on the cap 52 in front of an index 55.

The base plate according to the invention is used in the following manner:

In the course of firing, that is in the course of the first few shots after the apparatus has been put into position, the base plate A beds down into the ground where it soon assumes a steady position as shown in Figs. 1 and 2.

When a mortar is to be shifted to another site the extraction of a conventional base plate presents several difficulties.

With the arrangement according to the invention the latter are easily overcome. While the mortar is being fired, the head 18 is closed by the shutter 27. (Position shown in Fig. 5.) When it is desired to extract the base plate from the ground use is made of the powder charge and firing device. The latter, which in the course of firing is separated from the base plate with its constituent parts in the inoperative position shown in Fig. 6, must first be loaded before being fixed to the base plate. To this end the nut 39 is turned in such manner as to cause a displacement of the firing pin in the direction to upwardly displace the latter, that is in the direction of arrow *f*<sup>1</sup> (Fig. 6). The nut 39 bears against the body 28 through the assembly 40, 41, 44 and 45. As the firing pin is displaced the spring 35 is compressed. When the groove 42<sup>a</sup> of the firing pin coincides with the apertures 42 of the member 41 in the extreme position of the firing pin, that is when the screw 33 abuts against the lower end of the groove 34, the pin 43 is inserted in the apertures 42 and the firing pin is in this way locked in its loaded position. The firing mechanism is then screwed in the hole 24 of the head (Fig. 7) and the nut 39 is then screwed against the abutment 38 so that the firing pin is held solely by the pin 43 (Fig. 8).

Thus to free the firing pin 29 the pin 43 is merely pulled out from a distance by means of a cord or the like 56. The firing pin is urged forward in the direction of arrow *f*<sup>2</sup> by the spring 35 (Fig. 9) and, owing to its inertia, it passes through the position shown in Fig. 6 and its point 30 extends through the orifice 25, strikes the detonator 23 and thus explodes the powder charge 22. Then, under the action of the spring 36, which is compressed by the firing pin, the latter is slightly returned to the position

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shown in Fig. 10 so that a slight clearance *a* exists between the locking member 41 and the washer 40.

As a result of the explosion of the powder charge 22 the gases of combustion reach through the passageway 16 the chamber 5 in which the pressure suddenly rises. Since the gases cannot wholly escape through the apertures 51 of the venting device E, the remainder of these gases displaces the body of the base plate with respect to the movable member or ring 12 which forms a valve. As this member 12 is in contact with the ground over a sufficiently large surface, this member remains substantially stationary and it is the body of the base plate assembly which is raised and is thus disengaged from the ground. The movement is very rapid and due to inertia this body rises sufficiently to extract itself from the ground.

If for any reason the cartridge (21, 22 and 23) does not explode and a further firing is required, it is of course necessary to prevent the firing pin 29 from once again striking the cartridge during the dismounting operation. The necessary security is achieved by means of the auxiliary nut 45 which is moved from the position shown in Fig. 10 to that shown in Fig. 11 by screwing it along the member 31. The rotation of the nut may be effected either manually or preferably, as a safety measure, from a distance with the aid of a cord 57 fixed at one end to the hole 48 of the nut and wound round the groove 47 (Fig. 11). The nut 45 causes the member 41 to contact once more the washer 40 and the nut 39, which is itself supported against the abutment 38 of the firing pin. The latter is therefore maintained positively in its withdrawn position and the firing mechanism may be dismounted without danger of an accidental firing.

As will be understood, the pressure prevailing in the chamber 5 may be adjusted to suit the forces necessary to raise the body of the base plate by screwing or unscrewing the cap 52 of the venting device E. The device is therefore very readily adaptable to varying conditions and if necessary a single type of cartridge may be used for the projectile of the mortar and for the plate extracting device.

Although a specific embodiment of the invention has been described hereinbefore with reference to the accompanying drawings, it must be understood that modifications and changes may be made therein without departing from the spirit of the invention or the scope of the claims.

Thus the various fixing means of the illustrated screw type may be replaced by any other means, for example bayonet locking means, keying means, etc. In the illustrated example the gases from the cartridge exert pressure only on the member 12 which is movable relative to the body of the base plate, but of course there may be provided several movable devices disposed at other points of the base plate either directly under the panel 1 or under the anchoring webs 3.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:

1. Base plate for supporting on the ground the gun of a firing apparatus such as a mortar, said base plate comprising in combination: a body adapted to bear against and anchor in the ground and serve as a support for said gun, said body containing a chamber which communicates with the exterior through at least one aperture provided in the bearing surface of said body and with the upper face of said body through two passageways, a valve movable relative to said body, having a surface of contact with the ground and adapted to close said aperture when said body is embedded in the ground, a powder charge and firing device which is disposed in one of said passageways at the end thereof communicating with the upper face of said body for causing a displacement of said valve relative to said body under the action of the pressure of the gases due to the firing of said powder charge by said firing device, and a venting device disposed in the other passageway for modifying the effect

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the gases from the powder charge have on the movable member.

2. Base plate for supporting on the ground the gun of a firing apparatus such as a mortar, said base plate comprising in combination: a substantially flat panel adapted to bear against the ground, a central boss secured to said panel from which it depends for receiving the thrust of said gun and for anchoring in the ground, means for forming with said boss a chamber which communicates with the exterior through at least one aperture substantially parallel to the longitudinal axis of the boss and is directed towards the end of said boss, a valve movable along said boss outside said chamber, adapted as to close said aperture when the plate is embedded in the ground and having a surface of contact with the ground, two tubular members connecting said chamber with the upper face of said panel, a powder charge and firing device disposed in the end of one of said tubular members above said panel which permits by means of the pressure of the gases due to the firing of said powder charge by said firing device, the displacement of said valve relative to said boss, and a venting device disposed at the end of the other of said tubular members above said panel for modifying the effect the gases from the powder charge have on said valve.

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3. Base plate as claimed in claim 2, wherein said chamber has an annular form and said valve is formed of an annular member which is axially movable along said boss, the latter including a shoulder which limits the displacement of said valve.

4. Base plate as claimed in claim 2, wherein said venting device comprises an auxiliary member secured to said end of the corresponding tubular member and provided with an auxiliary extending blind aperture which communicates with the passageway through said tubular member and with the exterior through at least one radial aperture, and a cap threadedly engaging said auxiliary member for covering a variable portion of said aperture.

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