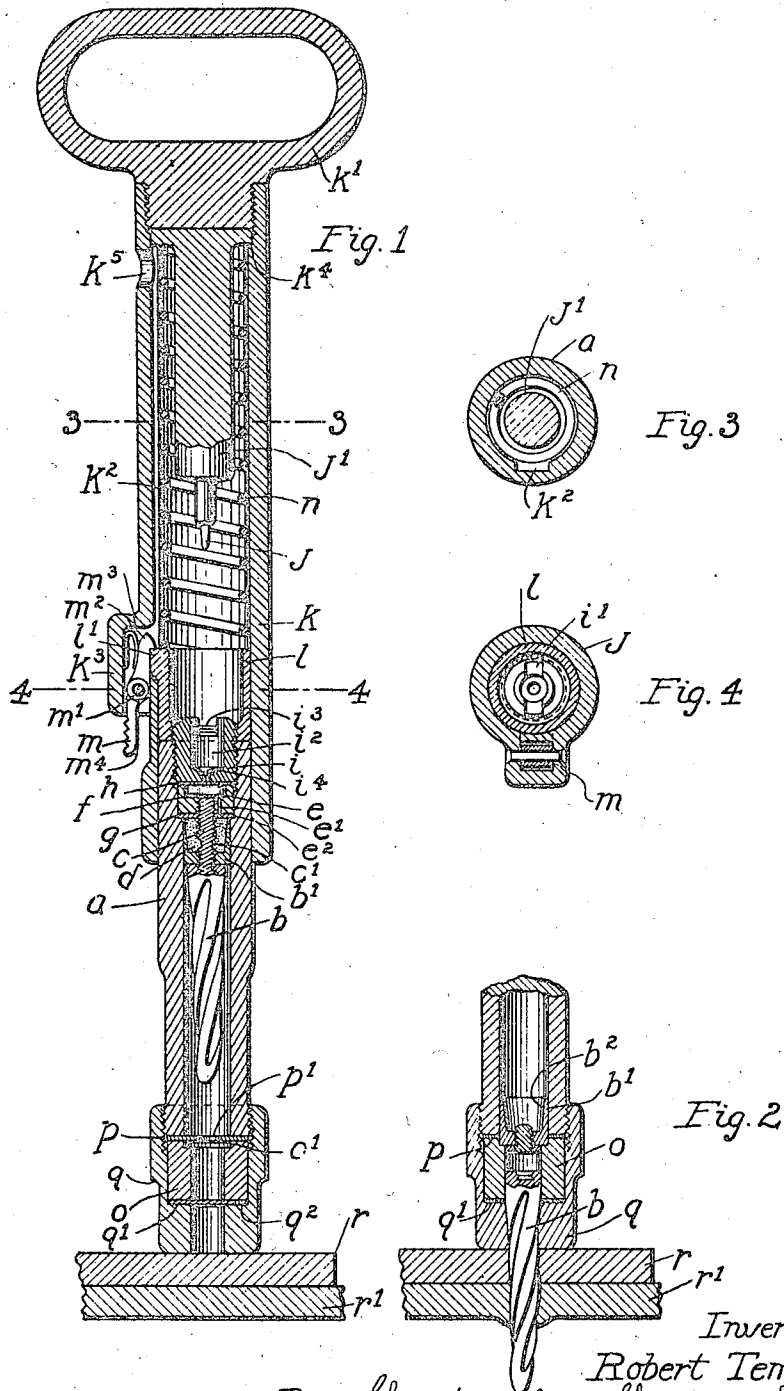


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EXPLOSIVELY ACTUATED PENETRATING MEANS.
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EXPLOSIVELY-ACTUATED PENETRATING MEANS.

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To all whom it may concern:

Be it known that I, ROBERT TEMPLE, a subject of the King of Great Britain, residing at Bromley, in the county of Kent, England, have invented certain new and useful Improvements in Explosively-Actuated Penetrating Means, of which the following is a specification.

This invention relates to improvements in explosively actuated penetrating means, and has for its object to provide a new and improved device comprising a penetrating member, an explosive actuating charge, and means to detonate the explosive charge, in combination with other structural features hereinafter described.

My invention is especially adapted for use in submarine work, for example, where it is desirable to affix repair plates or the like to the hull of a vessel in a minimum of time and with a minimum of effort, or where it is desirable to attach projecting means to the hull of the vessel to which or by which may be secured lines. There are numerous other uses to which my invention can be put.

The embodiment of my invention illustrated in the drawings comprises principally a holder, a barrel and a projectile affixing member, consisting of a member adapted to be projected by an explosive charge into the metal sheet or body to which it is to be affixed.

Another object of my invention consists in providing a device of the character described in which one holder may be utilized with any number of barrels and projectiles so that the user may attach a new barrel with projectile contained therein with a simple operation.

Another object consists in the provision of mechanism of the character described, in which the user will be protected from concussion under water.

These and other objects will be more fully described and set forth in the following specification and shown in the accompanying drawings, in which—

Figure 1 is a vertical cross section through a structure embodying my invention, showing the same located against the side of a vessel preliminary to attachment of the missile.

Fig. 2 is a detail showing the penetration of the projectile after actuation.

Fig. 3 is a transverse horizontal section along the line 3—3 of Fig. 1.

Fig. 4 is a similar section taken along the line 4—4 of Fig. 1.

Like characters refer to like elements throughout the drawings, in which *a* designates what I term the barrel. Located in the barrel is an affixing projectile member which comprises a fastening means arranged to penetrate the body to which it is to be attached. This projectile comprises the element *b* shown as tapered and having spiral grooves to facilitate penetration, and to permit flow of the penetrated metal into the groove to secure the projectile in its affixed position, this projectile being preferably constructed of highly tempered steel or the like. Located above the projectile *b* is the cup *b*¹ closely fitting the bore of the barrel *a*, provided with a cup shaped depression forming relatively thin walls *b*². Extending through the bottom of the cup *b*¹ and engaging the upper portion of the projectile *b* is the threaded screw *c* which normally secures the projectile *b* to the cup *b*¹ as shown in Fig. 1. An explosive charge of predetermined quantity and explosive force indicated by the letter *d* is carried in the cup *b*¹. Located above the cup *b*¹ is the detonator block *e* normally secured to the cup *b*¹ and projectile *b* by means of the screw *c*. Located between the detonator block *e* and the cup *b*¹ above the explosive charge *d* is a disk *g* of relatively tough material, such as copper or the like. The barrel *a* is slightly enlarged to accommodate the block *e*, forming a shoulder *e*² on which the disk *g* rests as shown in Fig. 1. This detonator block *e* is provided with a cup or depression in which is mounted a detonator *f*, a firing hole *e*¹ leading from the detonator chamber to the explosive charge *d*.

Located above the block *e* and detonator *f* is a disk *h* of copper or the like secured in place by the threaded plug *i*, which engages a threaded portion of the bore of the barrel *a*. This plug *i* is centrally apertured at *i*² and provided with a cross slot *i*³ for engagement by a screw driver or the like for assembly and disassembly. When in assembled position the plug *i* extends some distance above the top of the barrel *a* and is engaged by the internally threaded sleeve *l*, this sleeve being screwed down upon the top of the barrel *a* and projecting upwardly therefrom.

Coacting with the barrel *a* is the holder *k*, centrally apertured or bored to fit over the

end of the holder and provided with a longitudinal slot k^2 on the interior in which may slide the lug l' on the sleeve l . This slot k^2 terminates above the bottom of the holder k and prevents withdrawal of the barrel after engagement of sleeve l with plug i . The holder k is further provided with an enlarged portion k^3 in which is pivotally mounted a detent m mounted upon the pin m^1 and having a hooked end m^2 normally engaging the top of the sleeve l as shown in Fig. 1, being maintained in such position by the spring m^3 and removable from such position by the handle portion m^4 which projects outside of the holder k . Screwed into the top of the latter is the handle h^1 which also serves to maintain the firing rod j^1 in the holder in the seat provided by the shoulder h^4 as shown in Fig. 1. This firing rod is provided with a firing pin portion j of considerably smaller diameter than the firing rod and capable of penetrating the small opening i^4 in the bottom of plug i . A coiled spring n is located in the holder k and extends between the top of sleeve l and the bottom of the firing rod j^1 as shown in Fig. 1. An aperture k^5 is provided in the upper portion of the barrel a to permit egress of water from the holder k in actuation of the device.

The exterior of the barrel a at the muzzle is externally threaded and engaged by the nut q which is internally apertured to form a prolongation of the bore of the barrel a of less diameter for a purpose to be hereinafter described. An internal shoulder q^2 is provided in the nut q in which is seated a disk q^1 of copper or the like normally closing the bottom of the bore of the barrel against ingress of water, the upper portion of the bore being sealed by the disk h . Located between the disk q^1 and the muzzle of the barrel a is the block o centrally apertured to form a reduced continuation of the bore of the barrel a and secured in place by the nut q . The block o is provided with a seat o^1 and also serves to maintain a disk p held against the muzzle of the barrel a , this disk p being centrally apertured at p^1 to permit relatively easy penetration thereof by the projectile b .

In the use of my device, for example, where it is desired to secure a repair plate r to a side r^1 of a ship or some other submerged body, the holder and muzzle being in assembled relation, as shown in Fig. 1, are placed by the user with the end of the nut q against plate r which may have a predrilled hole therethrough after which, while grasping the handle h^1 the user may disengage the detent m from engagement with the top of the sleeve l , after which the holder k may be forced downwardly upon the barrel a against the action of the spring until the firing pin j strikes the disk h , de-

pression of which will detonate the detonating cap f which in turn will set off the charge of explosive d .

Threaded screw c is provided with a notch or groove c^1 as shown in Fig. 1. This screw will serve to temporarily secure the cup b^1 and the projectile b in place against pressure of the explosive charge until same has built up to a desired point, when the screw c will fracture at the notched portion c^1 and the projectile b with the cup b^1 will be projected downwardly in the bore of the barrel a as viewed in Fig. 1. The sides of the cup b^1 being comparatively thin, will be maintained in close contact with the bore owing to the expansion of the gases, and as I have constructed the cup b^1 and the projectile b of relatively small mass, they will be rapidly driven through the bore of the barrel a , the projectile b passing through disks p and q and through the plate r and side of the vessel r^1 . As the projectile and cup are approaching the final position shown in Fig. 2, the bottom of the cup b^1 will strike the copper disk p and be retarded thereby during a relatively short distance of travel until the bottom of the cup b^1 is seated upon the shoulder o^1 of block o . When the travel of the cup b^1 is terminated by the shoulder o^1 , the force of the projectile will either strip the bottom threads of screw c or shear off a portion of the screw permitting the projectile b to continue its travel until the upper portion thereof is brought to rest by the smaller bore of the plug o and nut q as shown in Fig. 2. After the actuation of the mechanism as described above, the holder k may be disengaged by rotation of the same. The lug l' being in the groove k^2 will rotate with the holder k and be unscrewed from the top of plug i , after which the holder and sleeve l may be removed and a new barrel with projectile, etc., substituted.

In the initial assembly of the structure, the plug i may be engaged by a screw driver in the slot i^3 and rotated to assembled position.

As stated before, the disks h and q maintain the bore of the barrel a free from water, thereby preventing dampening of the explosive charge. Also the impact or concussion from the explosion will not be transmitted to the water or to a diver or other user, this being prevented at one end of the bore of the barrel by the disk h and the other end by the cup b^1 and the projectile b as viewed in Fig. 2.

This device is capable of use not only where it is desired to attach repair or other plates to the side of a vessel or the like but also where it is desired to affix lines, cables, or the like, for various purposes, in which event it is only necessary to place the end of the barrel against the side of the body

into which the projectile is to be driven, as will be obvious. In this manner laborious and time-consuming drilling, riveting or the like is avoided.

5 It will also be obvious that there are many other uses to which my invention may be put, and many modifications and improvements which may be made, so that I do not wish to be restricted to the use of form
10 shown in the accompanying drawings and described in the specification, except as defined in the appended claims.

What I claim is:

1. In a device of the class described, an
15 affixing member, means to carry said member, and means to affix it to a body, said last named means comprising an explosive charge.

2. In a device of the class described, an
20 affixing member, means to carry said member, and means to affix it to a body, said last named means comprising an explosive charge carried by said affixing member.

3. In a device of the class described, an
25 affixing member, means to carry said member, means to affix it to a body, said last named means comprising an explosive charge, and means to explode said charge.

4. In combination, a barrel member, a
30 projectile for attachment to a body, carried by said barrel member, a holder, and means to detachably secure said barrel member to said holder.

5. In combination, a barrel member, a
35 projectile carried thereby for attachment to a body, an explosive charge, and means to explode said charge to cause said projectile member to penetrate and become embedded in said body.

6. In a device of the class described, a
40 projectile, means carrying said projectile, and means to actuate said projectile to penetrate and become embedded in a body and thereby secure said carrying means to said
45 body.

7. In combination, a barrel member, means to secure said barrel member to a metal body or the like, said means comprising a penetrating projectile and an explosive charge
50 coacting with said projectile upon explosion to cause the same to penetrate and become embedded in said metal body.

8. In a device of the class described, a
55 barrel member, a tapered projectile carried thereby, said barrel member being provided with a bore, said bore being reduced in diameter adjacent the muzzle of said barrel member, said projectile being of such size as to partially pass through said reduced bore
60 and be retained thereby.

9. In a device of the class described, a
65 barrel member having a bore, a member secured to said barrel at the end thereof, said last named member having a bore of reduced diameter in alignment with said barrel bore,

and a projectile member constructed to pass through said barrel bore and partially through the reduced bore of said member.

10. In a device of the class described, a
70 barrel member, and a projectile mounted therein, said projectile being provided with a cup.

11. In a device of the class described, a
75 barrel member, a projectile mounted therein, said projectile being provided with a cup, and an explosive charge carried by said cup.

12. In a device of the class described, a
80 barrel member, a projectile mounted therein, said projectile being provided with a cup, an explosive charge carried by said cup, and a threaded member normally securing said projectile to said cup.

13. In a device of the class described, a
85 barrel member, a projectile mounted therein, said projectile being provided with a cup, an explosive charge carried by said cup, a threaded member normally securing said projectile to said cup, and a detonating block carrying a detonator and located in said
90 barrel adjacent said cup.

14. In a device of the class described, a
95 barrel member, a projectile mounted therein, said projectile being provided with a cup, an explosive charge carried by said cup, a threaded member normally securing said projectile to said cup, and a detonating block carrying a detonator and located in said barrel adjacent said cup, said threaded
100 member also securing said detonator block to said cup and projectile.

15. In a device of the class described, a
105 barrel member, a projectile mounted therein, said projectile being provided with a cup, an explosive charge carried by said cup, a threaded member normally securing said projectile to said cup, and a detonating block carrying a detonator and located in said barrel adjacent said cup, said threaded
110 member also securing said detonating block to said cup and projectile, and being provided with a portion of reduced size to permit breaking thereof when the explosive force of said explosive has reached the desired amount.
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16. In a device of the class described, a
120 barrel having a bore, a projectile carrying said bore, means to drive said projectile through said bore, said means comprising a charge of explosive, and a removable disk sealing said explosive in said bore.

17. In a device of the class described, a
125 barrel member, a detonator block carried therein, an explosive charge carried in said barrel, means to seal said detonator and explosive charge in said barrel, said means comprising a disk of metal, and means to secure said disk in sealing position, said last named means comprising a threaded plug.

18. In a device of the class described, a
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barrel member, a detonator block carried therein, an explosive charge carried in said barrel, means to seal said detonator and explosive charge in said barrel, said means comprising a disk of metal, and means to secure said disk in sealing position, said last named means comprising a threaded plug, said plug being provided with an aperture.

19. In a device of the class described, a barrel member, a detonator block carried therein, an explosive charge carried in said barrel, means to seal said detonator and explosive charge in said barrel, said means comprising a disk of metal, means to secure said disk in sealing position, said last named means comprising a threaded plug, said plug being provided with an aperture, and a firing pin depressible relative to said block to pass through the aperture therein and detonate said detonator.

20. In a device of the class described, a barrel having a bore, a projectile carried therein, an explosive carrying member and a detonator, a metal disk sealing one end of said bore adjacent said detonator, and a second disk sealing the other end of said bore.

21. In a device of the class described, a barrel having a bore, a projectile carried therein, an explosive carrying member and a detonator, a metal disk sealing one end of said bore adjacent said detonator, a second disk sealing the other end of said bore, and means to secure said disks in sealing position, said means comprising a threaded plug coacting with said disk adjacent said detonator and a threaded nut member coacting with said other disk.

22. In a device of the class described, a barrel having a bore, a projectile member located therein, a cup carried thereby, means to expel said projectile through said bore, and means to retard said projectile adjacent the muzzle of said bore.

23. In a device of the class described, a barrel having a bore, a projectile member located therein, a cup carried thereby, means to expel said projectile through said bore, and means to retard said projectile adjacent the muzzle of said bore, said means comprising a shoulder engaging and arresting said cup.

24. In a device of the class described, a barrel having a bore, a projectile member located therein, a cup carried thereby, means to expel said projectile through said bore, means to retard said projectile adjacent the muzzle of said bore, said means comprising a shoulder engaging and arresting said cup, and a metal disk located adjacent said shoulder and engageable by said cup prior to the arresting of the latter by said shoulder.

25. In combination, a barrel having a bore, a projectile carried in said bore, a centrally apertured holder, said barrel be-

ing slidably mounted in said holder, and means to normally prevent reciprocation of said barrel and said holder.

26. In combination, a barrel having a bore, a projectile carried in said bore, a centrally apertured holder, said barrel being slidably mounted in said holder, and means to normally prevent reciprocation of said barrel and said holder, said last named means comprising a detent.

27. In combination, a barrel having a bore, a projectile carried in said bore, a centrally apertured holder, said barrel being slidably mounted in said holder, means to normally prevent reciprocation of said barrel and said holder, said means comprising a detent, and means to normally maintain said detent in operative position.

28. In combination, a barrel having a bore, a projectile carried in said bore, a centrally apertured holder, said barrel being slidably mounted in said holder, and means resisting movement of said barrel and said holder.

29. In combination, a barrel having a bore, a projectile carried in said bore, a centrally apertured holder, said barrel being slidably mounted in said holder, and means resisting movement of said barrel and said holder, said means comprising a coiled spring.

30. In combination, a barrel having a bore, a projectile carried in said bore, a centrally apertured holder, said barrel being slidably mounted in said holder, and a firing rod carried by said holder.

31. In a device of the class described, a holder member comprising a centrally apertured cylinder, a handle portion carried thereby, and a firing rod mounted in said aperture.

32. In combination, a barrel member having a bore, a projectile mounted in said bore, a detonator and explosive charge located in said bore, a holder, said barrel being slidably mounted in said holder, and means to normally prevent sliding of said barrel in said holder.

33. In combination, a barrel member having a bore, a projectile mounted in said bore, a detonator and explosive charge located in said bore, a holder, said barrel being slidably mounted in said holder, and means to normally prevent sliding of said barrel in said holder, said means comprising a sleeve member carried by said barrel, said barrel being provided with a slot, said sleeve member being provided with a lug sliding in said slot.

34. In combination, a barrel member having a bore, a projectile mounted in said bore, a detonator and explosive charge located in said bore, a holder, said barrel being slidably mounted in said holder, means to normally prevent sliding of said

barrel in said holder, said means comprising a sleeve member carried by said barrel, said barrel being provided with a slot, said sleeve member being provided with a lug
5 sliding in said slot, and a threaded plug securing said detonator and explosive charge in assembled relation, said plug securing said sleeve to said barrel.

35. In a device of the class described, a
10 barrel having a bore, a projectile mounted therein, a cup, a threaded member securing said cup to said projectile, means to expel said projectile and cup through said bore,

and means to arrest said cup prior to the completion of movement of said projectile. 15

36. In a device of the class described, a barrel having a bore, a projectile mounted therein, a cup, a threaded member securing said cup to said projectile, means to
expel said projectile cup through said bore, 20 means to arrest said cup prior to the completion of movement of said projectile, and means to finally arrest said projectile.

In testimony whereof, I have subscribed my name.

ROBERT TEMPLE.