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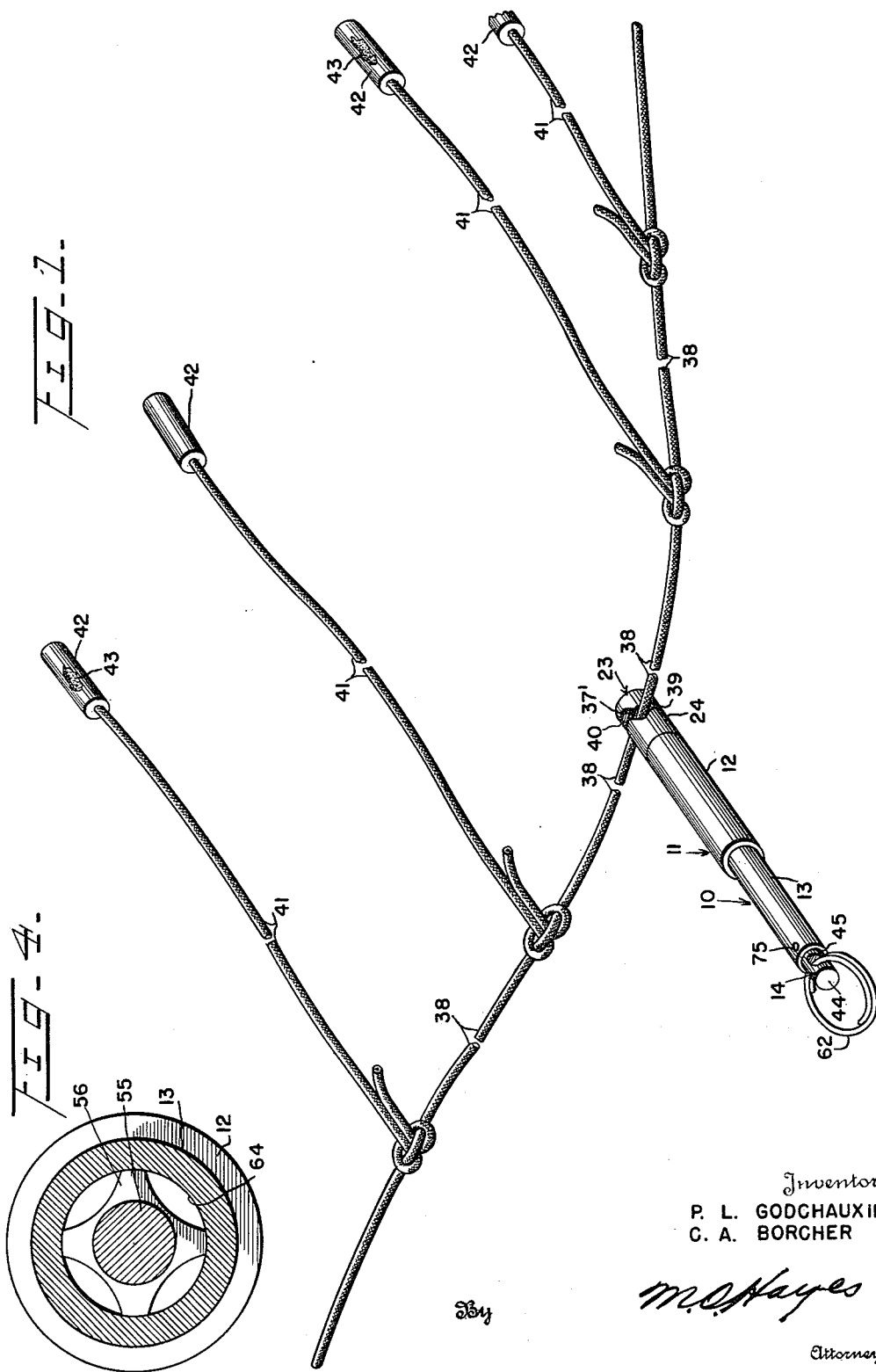
P. L. GODCHAUX II, ET AL

2,715,365

DEMOLITION FIRING DEVICE

Filed May 9, 1947

2 Sheets-Sheet 1



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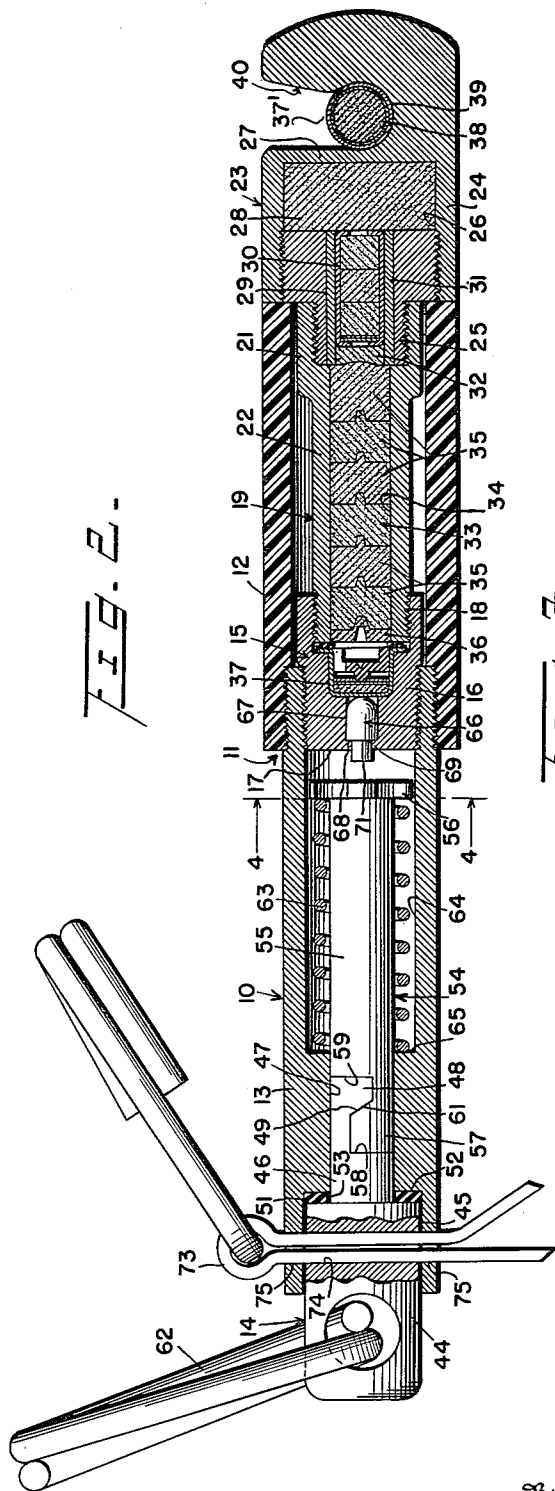
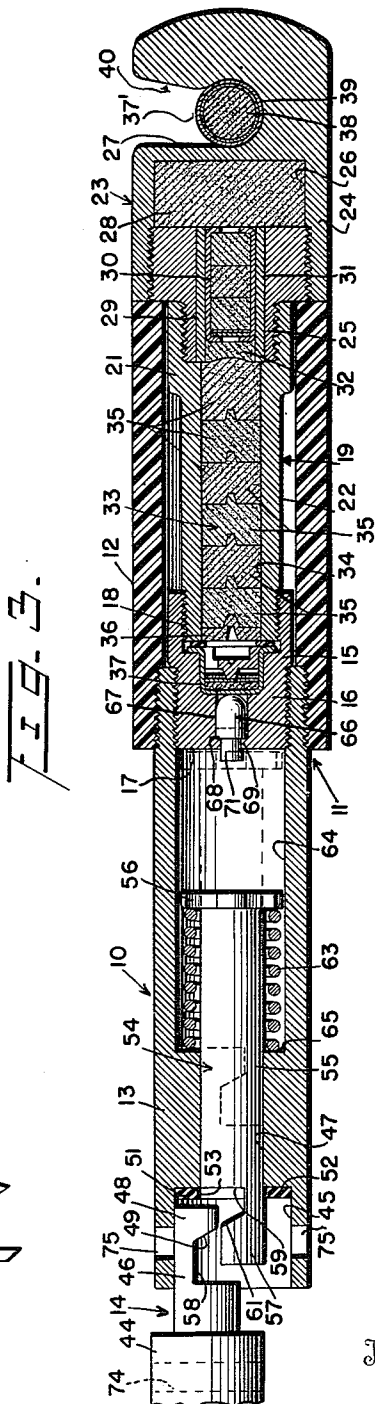
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2 Sheets-Sheet 2



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DEMOLITION FIRING DEVICE

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7 Claims. (Cl. 102—27)

(Granted under Title 35, U. S. Code (1952), sec. 266)

This invention relates to a demolition firing device adapted for use either on land or water, and more particularly to a device for firing in predetermined time delayed relation a main demolition charge and a plurality of additional demolition charges detachably secured thereto.

The present invention provides a new and improved demolition firing device in which means are employed for quickly and detachably securing an explosive trunk line thereto, the trunk line having a plurality of additional explosive charges operatively connected thereto and adapted to be fired thereby in predetermined time delayed relation with respect to the firing of the delay element within the demolition device.

More particularly the present invention relates to a demolition firing device adapted to fire a plurality of demolition charges and thereby cause wholesale destruction of enemy shore or underwater obstacles such, for example, as barbwire entanglements and underwater barriers and the like. The device of the present invention is adapted to fire a length of "Primacord" and a plurality of explosive charges connected thereto, the explosive force therefrom being adapted to destroy underwater obstacles thereby permitting landing operations to be executed efficiently and quickly, as time is most essential when such landing operations are in progress. The device is adapted to be quickly attached to and fire a length of "Primacord" and concurrently therewith a plurality of explosive charges operatively connected thereto thereby to clear a beach of barriers and permit landing boats and troops with their equipment to make a safe landing thereon. The device in connection with the aforesaid demolition charges may also be employed for destroying secret and confidential military equipment used by our armed forces in the event that sudden seizure thereof by the enemy appears probable. The device of the present invention, therefore, is adapted to fire a length of "Primacord" including a plurality of spaced additional "Primacords" secured thereto when a predetermined period of time has elapsed after the device has been set in operation, thereby to demolish water or land barriers.

One of the objects of the present invention is the provision of a demolition firing device in which means are employed for firing a length of "Primacord" connected to a plurality of explosive charges in predetermined time delayed relation with respect to the initial firing of the firing device.

Another object of the invention is the provision of a new and improved firing device in which a plurality of demolition charges are adapted to be quickly and detachably secured thereto and fired thereby.

Another object of the invention is the provision of a new and improved firing device adapted to fire an elongated explosive charge and concurrently therewith a plurality of additional explosive charges connected thereto.

A still further object is to provide a new and improved demolition firing device which is economical to manu-

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facture, reliable in operation and which possesses the qualities of durability and safety during handling and transportation.

Still further objects, novel features and advantages of the invention will become apparent from the following description taken in connection with the accompanying drawings, wherein:

Fig. 1 is a view of the demolition firing device showing the manner in which the demolition charges are secured thereto;

Fig. 2 is an enlarged longitudinal sectional view of the demolition firing device of Fig. 1 showing the parts thereof in a safe or unarmed position;

Fig. 3 is a view similar to Fig. 2 but showing the demolition firing device in the armed position in full lines and also showing the plunger in the firing position thereof in dashed lines; and

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 2.

Referring now to the drawings for a more complete understanding of the invention, the demolition firing device disclosed thereon is generally indicated by the reference character 10 and comprises an elongated casing 11 including a tubular insulating body 12 composed of any material suitable for the purpose such, for example, as plastic and having threaded engagement with a sleeve 13 adapted to slideably receive a firing mechanism generally indicated by the numeral 14. Secured to the tube 13 in any suitable manner such, for example, as by threading the parts together is an adapter 15, the adapter comprising a body 16, end wall 17 integrally formed thereon, and an internally threaded well 18 adapted to have threaded engagement with one end portion of a member 19.

The member 19 comprises a head 21 having a reduced tubular sleeve 22 integrally formed thereon and spaced a predetermined distance from the inner periphery of the body 12 thereby to provide an air space therebetween, the end portion thereof being secured to the adapter 15 in the aforesaid manner.

An exploder generally indicated by the reference character 23 and comprising a casing 24 is secured to the head 21 in any suitable manner preferably by a nipple 25 secured to one end of the exploder and having threaded engagement with the internally threaded portion of the head 21, the nipple being secured to the casing 24 of the exploder as by threaded engagement therewith. As clearly shown on Figs. 2 and 3 the nipple is threaded into the casing 24 a predetermined amount thereby to provide a chamber 26 within the casing, the chamber being disposed between one end portion of the nipple 25 and a relative thin wall 27 on the exploder. Arranged within the chamber and in abutting engagement with one end portion of the nipple 25 and with the wall 27 is an explosive charge 28 such, for example, as a tetryl pellet. The nipple 25 is provided with a centrally disposed bore 29 extending therethrough in which is arranged a sleeve 31 composed of any material suitable for the purpose. Disposed within the sleeve 31 is a detonator 30 having one end thereof in abutting engagement with the tetryl pellet 28, the other end thereof being in abutting engagement with an igniter charge 32 arranged within one end of the sleeve 31 and adapted to fire the detonator which, in turn, fires the tetryl pellet 28 in predetermined time delayed relation with respect to the firing of a delay train 33 arranged within a bore 34 formed in the sleeve 22.

The delay train comprises a plurality of pellets 35 arranged in abutting engagement with respect to each other and composed of any free and comparatively slow burning powder suitable for the purpose, the burning time of the delay train being subjected to variations such, for example, as from 30 to 120 seconds depending upon the

length of the delay assembly disposed therein. As shown on Figs. 2 and 3 the pellets 35 of the delay train are arranged in abutting relation with respect to each other and the end pellets thereof are respectively arranged in engagement with an igniter charge 36 disposed in one end of the sleeve 22 and one end of the igniter charge 32 disposed in one end of the sleeve 31. Thus a continuous combustible train is provided from a percussion cap or primer 37 arranged within the reduced portion of the well 18 to the detonator 30.

As best shown on Figs. 2 and 3 the casing 24 of the exploder has arranged therein a slot 40 adapted to receive an explosive "Primacord" 38 of any desired length and detachably secured in the slot adjacent the pellet 28. The walls defining the restricted portion 37' of the slot are substantially parallel with respect to each other and terminate in a substantially circular portion 39. By this arrangement the "Primacord" is compressed or distorted as the cord is inserted into the restricted portion 37' of the slot, it being understood, that the cord is of greater diameter than the width of the restricted portion of the slot. Thus when the "Primacord" has been forced through the restricted portion of the slot and enters the circular portion thereof it seats therein. When this occurs the "Primacord" will assume its original shape Figs. 2 and 3 thereby to prevent the cord from being readily withdrawn from the slot and also disposing the "Primacord" in the most advantageous position with respect to the pellet 28 such that the full force of the explosion as the pellet 28 is fired will be concentrated on the "Primacord" thus causing detonation thereof.

Secured to the "Primacord" 38 in any suitable manner such, for example, as shown on Fig. 1 of the drawings is a plurality of spaced "Primacord" 41 having respectively arranged on the free ends thereof a container 42 in which is disposed a quantity of explosive material 43, it being understood, however, that as the "Primacord" 38 is fired by the pellet 28, the spaced cords 41 and explosive material within the containers are fired concurrently therewith, the force of the explosion therefrom being sufficient to destroy the defense barrier. While the invention has been described as employing a container secured to an end of each "Primacord" and having a quantity of explosive material therein, it will be understood, however, that any suitable explosive may be used such, for example, as plastic explosive, the plastic explosive being adapted to be mounted on the free ends of the cords, if desired.

The firing mechanism 14 comprises a plug 44 slideably arranged within a well 45 disposed in one end of the sleeve 13 and extending a predetermined distance therebeyond, Figs. 2 and 3. Integrally formed on the plug 44 is a shank 46 extending a predetermined distance into a reduced bore 47 arranged in the sleeve 13 and in communication with the well 45, the shank having a lug 48 formed thereon on which is disposed a cam surface 49, the purpose of which will be more fully described hereinafter.

A sealing gasket 51 composed of any material suitable for the purpose such, for example, as rubber or the like is arranged within the well 45 and disposed between one end portion of the plug 44 and a shoulder 52 on the sleeve 13 thus providing a moisture proof seal therebetween whereby deterioration of the pyrotechnic materials contained within the demolition firing device is prevented. The gasket 51 is provided with a centrally disposed opening 53 through which the shank 46 extends.

A plunger 54 is slideably arranged within the bore 47 and releasably connected to the shank 46 and comprises a body 55 having a fluted striker 56 formed on one end thereof, the other end being provided with a lug 57 adapted to seat in a recess or cutaway portion 58 arranged in the shank 46. As shown on Figs. 2 and 3 the plunger 54 is provided with a recess or cutaway portion 59 thereby to provide a seat for the lug 48. Lug 57 has formed thereon a cam surface 61 adapted to coact with the

complementary cam surface 49 on the lug 48 thereby to release the plunger from interlocking engagement with the shank 46 when the shank has been moved outwardly a predetermined amount. It will be understood, however, that when the plunger 54 has been moved outwardly to the position shown in full lines on Fig. 3 in response to a sudden pull on the pull ring 62 secured to the plug 44, by the operator, the shank thereon is disengaged from the plunger. When this occurs the plunger is free to move inwardly to a firing position in response to the pressure applied thereto by a spring 63 arranged within an enlarged bore 64 in the tube 13 and surrounding the plunger, the respective ends of the spring being in abutting engagement with the striker 56 on the plunger and a shoulder 65 formed on the tube 13 at the juncture of the walls defining the bores 47 and 64.

It will be apparent from the foregoing description, that the cam surface 49 on the lug 48 is adapted to coact with the complementary cam surface 61 on the lug 57 in such a manner as to permit release of the plunger 54 from the shank 46 when the plunger has been moved to an armed position, Fig. 3. The release of the plunger is effected in response to the pressure applied thereto by the spring 63, in conjunction with the cam action between the cam surfaces 49 and 61 as the plunger is moved outwardly sufficiently to bring the lugs 48 and 57 beyond the shoulder 65 and into the well 45. When this occurs the lugs 48 and 57 will become disengaged and release of the plunger is effected.

As the plunger is released it is moved to a firing position shown in dashed outline on Fig. 3 in response to the pressure exerted thereon by the spring 63, the striker 56 being driven into engagement with the firing pin 66 with sufficient force to drive the pin into firing engagement with the percussion cap 37 thereby to initiate firing of the time delay train 33. The firing pin 66 is slideably arranged in a bore 67 disposed within the wall 17 of the member 15 and maintained therein by complementary shoulders 68 and 69 respectively formed on the firing pin and the wall 17. A reduced end portion 71 of the pin 66 extends a slight distance beyond the outer surface of the wall 17 in such a manner as to permit the striker 56 on the plunger to engage the portion 71 thereon and move the pin a predetermined amount as the plunger is moved to the firing position by the spring.

As shown on Fig. 2 the device is maintained in a safe condition by a pin 73 extending through a bore 74 arranged in the plug 44 and complementary openings 75 in the sleeve 13, thus sliding movement of the plug is prevented until the pin is withdrawn from the aforesaid bore and openings.

It will be understood, however, that when the demolition charges are desired to be fired, safety pin 73 is removed from engagement with the plug 44 and sleeve 13, Fig. 2, the ring 62 secured to the plug 44 will be grasped by the operator and a direct outward pull applied thereto by the operator whereupon sliding movement is imparted to the plug 44 and plunger 54, the spring 63 is additionally contracted between the striker 56 and shoulder 65. After the plug 44 has been moved a predetermined amount by the operator, the lug 48 on shank 46 will become disengaged from lug 57 on plunger 54 in response to the pressure exerted on the plunger by the spring 63 and the action between the cam surfaces on lugs 48 and 57 thereby releasing the plunger from interlocking engagement with the shank.

When the plunger has been released continued action of the spring 63 will urge the plunger to a firing position as shown in dashed outline, Fig. 3 with the striker 56 thereon in operative engagement with the firing pin 66, the force exerted on the firing pin by the spring being sufficient to fire the percussion cap 37 thus igniting the igniter charge 36 arranged on one end of the time delay train 33 which in turn ignites the delay train. After a predetermined period of time controlled by the delay train has elapsed, the igniter charge arranged in one end

of the sleeve 31 will be ignited thus initiating firing of the detonator 30. As the detonator is fired the force of the explosion therefrom is sufficient to fire the tetryl pellet 28, and concurrently therewith, and initiated thereby, the "Primacord" 38 is fired, which in turn fires the "Primacords" 41 and explosive charges 43, the force of the explosion of the charges and the "Primacords" being sufficient to destroy underwater or field barriers, as the case may be.

It will be understood, that the demolition firing device is preferably employed for firing a plurality of demolition charges placed under water by a crew of skilled swimmers thereby to destroy underwater barriers sufficiently to permit landing boats and the like to be beached quickly and with negligible damage thereto, and in which the delay train after ignition thereof burns sufficiently slow to permit the swimmer to be well out of range of the explosion when the demolition charges are fired.

While the device has been described in particularity with reference to a plurality of demolition charges adapted to be fired thereby in time delayed relation for destroying underwater barriers and the like, it will be understood that, if desired, the device may be used in connection with destroying secret equipment, field equipment, and field barriers.

The many advantages of the demolition firing device constructed in accordance with the present invention will be readily apparent from a consideration of the foregoing description and drawings, and although a preferred embodiment of the device is illustrated and described, it is to be understood that changes in the details of construction and in the combination and arrangement of parts may be resorted to which fall within the scope of the invention as claimed.

The invention disclosed and claimed herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A demolition firing device comprising an elongated casing, a head secured to one end of said casing and having a slot formed therein, said slot comprising a restricted portion and a circular portion for receiving and quickly locking an explosive cord of greater diameter than the width of said restricted portion to said head as the cord is forced through the restricted portion into said circular portion, a slow burning time delay element arranged within said casing, a releasable firing means slideably arranged within the casing and adapted to be moved a predetermined amount to an armed position, means releasably secured to said firing means for actuating the firing means to said armed position, a pair of complementary inclined cam surfaces arranged on the firing means and the actuating means respectively for releasing said firing means as the firing means is moved to said armed position, resilient means operatively engaging said firing means for urging the firing means from said armed position to a firing position as the firing means is released thereby to fire said time delay element, a detonator fired by the time delay element in predetermined time delayed relation with respect to the firing of the delay element, an explosive charge arranged within said head in abutting engagement with said detonator and fired thereby, and a wall on said head composed of relatively thin material in abutting engagement with said explosive charge and said explosive cord and effected by the force of the explosion as the explosive charge is fired for applying sufficient shock to said cord to cause detonation thereof.

2. A demolition firing device comprising an elongated casing, a head secured to one end of said casing and having a slot formed therein, said slot comprising a restricted portion and a circular portion for receiving and quickly locking an explosive cord of greater diameter than the

width of said restricted portion to said head as the cord is forced through said restricted portion into said circular portion, a detonator arranged within said casing, a slow burning time delay element abutting the detonator, a releasable firing plunger slideably arranged within said casing and adapted to be moved a predetermined amount to an armed position, means releasably secured to said firing plunger for actuating the firing plunger to said armed position, means on said firing plunger and adapted to coact with complementary means on the actuating means for releasing said firing plunger as the plunger is moved to said armed position, a spring operatively engaging said firing plunger for urging the firing plunger from said armed position to a firing position as the firing plunger is released thereby to fire the time delay element and explode the detonator in predetermined time delayed relation with respect to the release of the firing plunger, explosive means arranged within said head in abutting engagement with said detonator and fired by the detonator, and a wall on said head composed of relatively thin material in abutting engagement with said explosive means and said explosive cord and effected by the force of the explosion as the explosive means is fired for applying sufficient shock to said cord to cause detonation thereof.

3. A demolition firing device comprising an elongated casing, a head secured to one end of said casing and having a slot formed therein, said slot comprising a restricted portion and a circular portion for receiving and quickly locking a percussion type explosive cord of greater diameter than the width of said restricted portion to said head as the cord is forced through the restricted portion into said circular portion, a percussion cap arranged within said casing, releasable firing means arranged within said casing and adapted to be moved slideably to an armed position, means releasably connected to said firing means for actuating the firing means to said armed position, means on said actuating means for releasing said firing means as the firing means is moved to the armed position, a resilient member surrounding said firing means for urging the firing means from said armed position to a firing position as the firing means is released thereby to fire said percussion cap, an explosive charge arranged within said head, a detonator for firing the explosive charge, a wall on said head composed of relatively thin material in abutting engagement with said explosive charge and said explosive cord and effected by the force of the explosion as the explosive charge is fired for applying sufficient shock to said cord to cause detonation thereof, and means fired by said percussion cap for exploding the detonator in time delayed relation with respect to the firing of said percussion cap.

4. A demolition firing device comprising an elongated casing, a head secured to one end of said casing and having a slot formed therein, said slot comprising a restricted portion and a circular portion for receiving and quickly locking a percussion type demolition charge of greater diameter than the width of said restricted portion to said head as the cord is forced through said restricted portion into said circular portion, a time delay element arranged within said casing and adapted to burn for a predetermined period of time when ignited, means including a percussion cap for igniting said time delay element, firing means arranged within said casing and adapted to be moved slideably to an armed position, means releasably connected to said firing means for actuating the firing means to said armed position and adapted to release the firing means when moved to the armed position, a spring operatively engaging said firing means and said casing for urging the firing means from said armed position to a firing position as the firing means is released thereby to fire said percussion cap, means on said actuating means for releasing said firing means, an explosive charge arranged within said head, a detonator fired by said time delay element for initiating the explo-

sion of said explosive charge, and a wall on said head composed of relatively thin material in abutting engagement with said explosive charge and said demolition charge and effected by the force of said explosion for applying sufficient shock to said cord to cause detonation thereof.

5. A demolition firing device comprising a casing, a head secured to one end of said casing and having a slot formed therein, said slot comprising a restricted portion and a circular portion for receiving and quickly locking an explosive cord of greater diameter than the width of said restricted portion to said head, means on said casing for detachably securing said cord, a releasable firing plunger slideably arranged within said casing and adapted to be moved a predetermined amount to an armed position, means detachably secured to said firing plunger for actuating the plunger to said armed position, means on said actuating means and including a gasket for hermetically sealing the casing until the actuating means is moved said predetermined amount, a spring surrounding the plunger for urging the plunger from said armed position to a firing position when the actuating means is detached therefrom, an explosive charge, means fired by the plunger for initiating the explosion of said explosive charge, and a wall on said head composed of relatively thin material in abutting engagement with said explosive charge and said explosive cord and effected by the force of said explosive for applying sufficient shock to said cord to cause detonation thereof.

6. A demolition firing device comprising an elongated casing, a head secured to one end of said casing and having a slot formed therein, said slot comprising a restricted portion and a circular portion for receiving and quickly locking a demolition cord of greater diameter than the width of said restricted portion to said head as the cord is forced through the restricted portion into said circular portion, an explosive charge disposed within said head, a wall on the head composed of relatively thin material in abutting engagement with said explosive charge and the demolition cord and effected by the force of the explosion as the explosive charge is fired for ap-

plying sufficient shock to said cord to cause detonation thereof, a detonator arranged within the head in abutting engagement with said explosive charge for firing said charge, a delay element arranged within the casing for firing said detonator when a predetermined period of time has elapsed, and means including a percussion cap arranged within the casing for igniting said delay element.

7. A demolition firing device comprising an elongated casing, a head secured to one end of the casing and having a slot formed therein for receiving and quickly locking a percussion type demolition charge therein, said head having a wall composed of relatively thin material bordering on one side of said slot in engagement with said demolition charge and adapted to be driven suddenly and forcibly into firing engagement with said charge, said head having a mass bordering on the other side of said slot in engagement with the demolition charge for preventing movement and effecting the blow of said thin wall against the demolition charge as the thin wall is driven into said firing engagement therewith, a detonator arranged within said casing, an explosive charge disposed within said head in abutting engagement with the thin wall and fired by said detonator for driving the wall into firing engagement with said demolition charge, a delay element arranged within the casing for firing said detonator when a predetermined period of time has elapsed, and means including a percussion cap arranged within the casing for igniting said delay element.

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