April 30, 1940. L. A. DUNAJEFF 2,198,907

SYSTEM FOR LAYING SUBMARINE MINES

Original Filed Jan. 7, 1937

Fig. 1

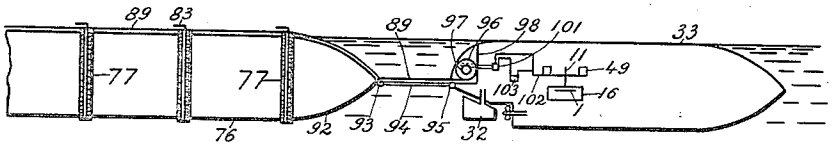


Fig. 2

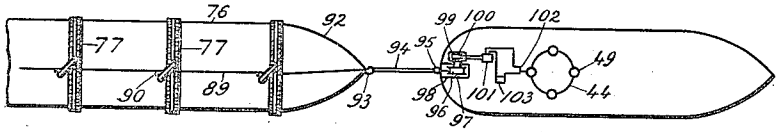


Fig. 3

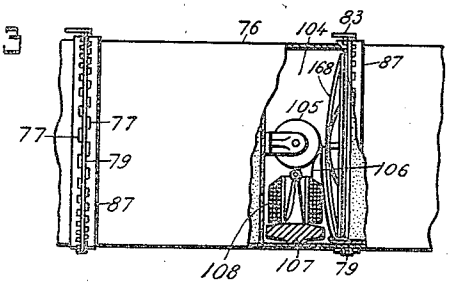


Fig. 4

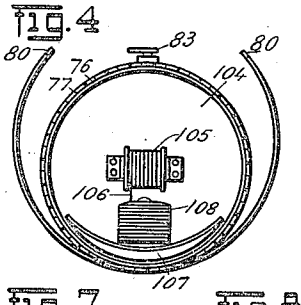


Fig. 5

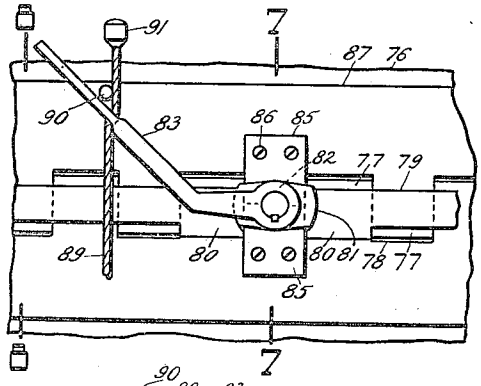


Fig. 7

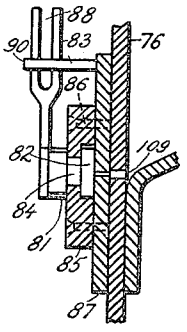


Fig. 8

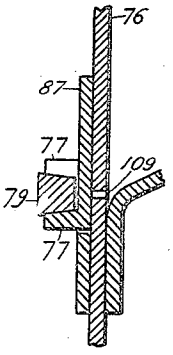


Fig. 6

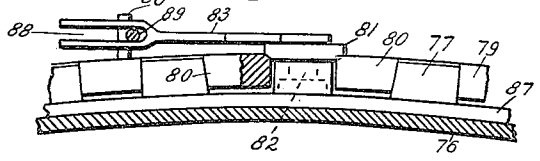


Fig. 9

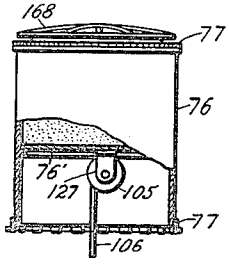
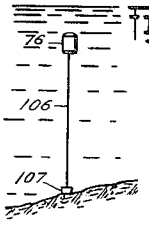


Fig. 10



INVENTOR.
LEONID A. DUNAJEFF
BY John P. Wikdonow
ATTORNEY.

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SYSTEM FOR LAYING SUBMARINE MINES

Leonid A. Dunajeff, New York, N. Y., assignor to Commercial Ingredients Corporation, New York, N. Y.

Original application January 7, 1937, Serial No. 119,446. Divided and this application November 18, 1938, Serial No. 241,131

10 Claims. (Cl. 114—0.5)

My invention relates to a system and method for laying submarine mines and has particular reference to apparatus for towing submarine mines and for planting them at spaced intervals.

This is a divisional application of my application Serial No. 119,446, filed January 7, 1937.

My invention has for its object to provide means to join a plurality of mines into a single train or floating body which can be towed in water by a suitable boat. For this purpose I employ specially constructed cylindrical mines which include a length of cable and sinkers and are releasably joined together, forming a long cylindrical body. The joints are provided with releasing devices operated by a cable so that the mines can be released one after another, the cables and sinkers being then released for anchoring the mine at the spot where it was released.

Another object of my invention is to provide an automatic mechanism on a towing boat for periodically pulling on the mine releasing cable in order to release the mines at a predetermined distance one from the other, independently of the speed of the movement of the boat. For this purpose I use a distance measuring device adapted to operate a motor which unwinds the releasing cable, the measuring device having adjustable contact mechanism for operating the motor at the desired intervals.

My invention is more fully described in the accompanying specification and drawing in which—

Fig. 1 is a fractional view of a train of mines being towed by an automatic submarine.

Fig. 2 is a top plan view of the same.

Fig. 3 is a detail view of a mine.

Fig. 4 is a detail view of a locking mechanism between the mines in an opened or released position.

Fig. 5 is a detail view of a locking and releasing mechanism.

Fig. 6 is another view of the same.

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

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

Fig. 9 is a view of a detached mine partly in section.

Fig. 10 is a view of the mine anchored to the sea bottom.

My submarine mine is so made that it can be joined into a single body or train as shown in Fig. 1 and have specially formed cylindrical body 76 with toothed flanges 77 at the ends, the teeth of one mine shell being adapted to enter into corresponding recesses 78 of the next shell. The teeth are raised above the flange and are tapering inside for a tapering connecting ring 79.

The ring 79 is made of a resilient steel bar bent to a larger radius than the shell 76 as shown in Fig. 4, so that its ends must be forced into the space between the teeth 77. The ends are provided with hooks 80 fitting into corresponding slots 78 and engaging sides of the adjacent teeth 77 as shown in Fig. 5. These hooks prevent the ends of the ring from sliding outwardly in tangential direction. The radial expansion of the ends is prevented by a latch plate 81 mounted on a stub shaft 82 and having a handle 83. The shaft 82 has a recess 84 engaged by correspondingly shaped ends of bearing plates 85 fastened by screws 86 to plates 87 carrying the teeth 77. The ends of the latch plate are curved to fit curved recesses in the ends of the ring 79 when the latch is turned into the locking position as shown in Fig. 5. When turned at right angles into the unlocking position, the latch releases the ring, causing its ends to snap out as shown in Fig. 4, completely releasing the last mine. The end of the latch handle is forked, having a slot 88 for a releasing rope 89. The latter is guided by pins 90 fitted in the plates 87.

The end of the rope has an enlargement or knob 91 which engages the fork when the rope is pulled for turning the latch plate into the unlocking position. By successively pulling on the rope, the mines are released from the train one by one, beginning at the rear.

The rope can be pulled manually if the train is towed by a manned boat, but it can be also operated automatically when my automatically piloted boat is used. The train of the mines is fitted at both ends with pointed end pieces 92 to reduce the water resistance, the front end piece being hingedly connected at 93 to a rod 94, the other end of which is hingedly connected at 95 to the stern of the boat 33. The hinges are preferably arranged at different angles in order to obtain fredom of motion in all transverse directions.

The end of the rope 89 is wound on a drum 96 mounted on a shaft 97 and located in an open pocket 98 in the stern of the boat. The shaft extends inside and has a worm gear 99 in mesh with a worm 100 on the shaft of an electric motor 101. The latter is controlled by a swtich 102 connected with a battery 103. The switch is closed by the disc 44 or by a certain counter or counters. With this arrangement it is possible to lay mines during certain runs only, no mines being laid while the train is being towed to the mine fields.

My automatic boat can be made of a small size, sufficient only for a small radius of operations, so that it can be towed to the mine fields by a larger boat or submarine together with several trains; then the automatic boat can be set for a certain course to lay one train of mines and to return back to its base. The course can be then changed for the next train, and so on. To expedite the resetting of the course, complete new assemblies of discs 44 can be changed for every new cruise. These disc assemblies can be mounted at the side of the compass, having suitable transmission from the central shaft 8 to the shaft 11.

Ordinary mines cannot float with their ropes and anchors or sinkers, so that I use specially designed mines having an air compartment 104 with a pulley or drum 105 for the mooring rope 106 also a space for a sinker 107 with a coil of mooring rope 108. The mine abuts the rear of the train by its air compartment, an air-tight joint being formed by using a rubber gasket 109.

The air chamber 104 becomes flooded as soon as the mine is separated from the train, the sinker falls, and the rope becomes unwound as shown in Fig. 6.

The train of my mines can be buoyed to float in a submerged position in order to render the train invisible. A number of such trains can be connected together by the links 94 if it is desired to lay a very large number of mines in a single trip, towing the mines by a large boat, manually or automatically piloted.

It is understood of course, that my apparatus can be further modified without departing from the spirit of my invention.

I claim as my invention:

1. A system for laying submarine mines comprising a plurality of mines detachably connected together into a rigid cylindrical train adapted to be towed over water by a boat, sinkers and mooring rope supported in the mines, and means operable from the boat for successively releasing the mines from the train thereby permitting the sinkers to fall out of the mine with the rope.

2. A system for laying submarine mines comprising a plurality of cylindrical mines detachably joined together by their ends and forming a cylindrical train, each mine being adapted to form an air chamber at the side joined with the train, a sinker and rope removably supported in the air chamber, a flexible member extending along the train and adapted to successively release the mines when pulled, a boat adapted to tow the train over water, and means on the boat for pulling the flexible member.

3. A system for laying submarine mines comprising a plurality of mines detachably joined together and forming a train adapted to be towed over water by a boat, a flexible member extending over the train and adapted to successively release the mines when pulled, a drum for winding the flexible member on the boat, a motor for the drum, a rotary member on the boat, means to rotate the rotary member in accordance with the distances traversed by the boat, and means to periodically close the electric circuit for the motor by the rotary member thereby successively releasing the mines through the flexible member.

4. A system for laying submarine mines comprising a plurality of cylindrical mines detachably joined together by their ends and forming a cylindrical train, each mine being adapted to form an air chamber at the side joined with the train, a sinker and rope removably supported in the air chamber, a flexible member extending along the train and adapted to successively release the mines when pulled, a boat adapted to tow the train over water, an articulated connection between the boat and the train, means to slidably support the flexible member on the articulated connection, and means on the boat for pulling the flexible member.

5. A system for laying submarine mines comprising a plurality of mines detachably joined together and forming a train adapted to be towed over water by a boat, a flexible member extending over the train and adapted to successively release the mines when pulled, a drum for winding the flexible member on the boat, means to rotate the drum for pulling the flexible member for releasing the end mine, means to indicate the distance traversed by the boat, and means to control the rotation of the drum for releasing the mines at predetermined intervals.

6. A system for laying submarine mines comprising a plurality of mines having tubular shells successively abutting each other at their ends, flanges on the ends, resilient expansive rings engaging the flanges, means to releasably lock the ends of the rings thereby locking the flanges together, means to tow the mines in water, and a flexible member passing over the mines and adapted to successively engage the locking means, the member being adapted to be periodically pulled thereby successively releasing the locks and allowing the rings to expand and to free the flanges for releasing the mines one after another.

7. A system for laying submarine mines comprising a plurality of mines having tubular shells successively abutting each other at their ends, flanges on the ends, resilient expansive rings engaging the flanges, means to releasably lock the ends of the rings thereby locking the flanges together, means to tow the mines in water, a flexible member passing over the mines and adapted to successively engage the locking means, the member being adapted to be periodically pulled thereby successively releasing the locks and allowing the rings to expand and to free the flanges for releasing the mines one after another, the mines containing each a length of a mooring rope with a sinker on the end adapted to be released when the mine is released from the train, and means to seal the joints between the successive mines for retaining air in the compartments for the sinkers thereby enabling the mines to float with the added weight of the ropes and sinkers.

8. A system for laying submarine mines comprising a plurality of mines having tubular shells successively abutting each other at their ends, flanges at the ends having outwardly tapering surfaces adapted to engage the tapering surfaces on the flanges, means to releasably lock the ends of each ring together, the ring, by sliding over the tapering sides of the flanges, being adapted to draw together the flanged ends of the abutting mines, the mines being adapted to be towed in water, a flexible member passing over the locking means of the mines, and enlarged portions on the flexible member adapted to engage the locking means for releasing the same when the flexible member is pulled, the enlarged portions being spaced at progressively increasing intervals so as to successively release one mine after another when the flexible member is being pulled.

9. A system for laying submarine mines com-

prising a plurality of mines having tubular shells successively abutting each other so as to form an elongated train of mines adapted to be towed in water, flanges on the ends, teeth on the flanges, teeth of one flange being staggered in relation to the teeth of the adjacent flange and extending beyond the teeth of the adjacent flange, the inner sides of the teeth being outwardly tapered, a resilient expansive ring with tapering sides placed between the teeth at each pair of flanges, releasable locking devices at the ends of the ring adapted to hold the ends together thereby forcing the teeth apart by the ring and drawing the abutting ends of the mines together, and means to successively release the locking devices, the rings when released being adapted to spring free from the teeth thereby releasing the end mine.

10. A system for laying submarine mines comprising a plurality of mines having tubular shells successively abutting each other so as to form an elongated train of mines adapted to be towed in water, flanges on the ends, teeth on the flanges, teeth of one flange being staggered in relation to the teeth of the adjacent flange and extending beyond the teeth of the adjacent flange, the inner sides of the teeth being outwardly tapered, a resilient expansive ring with tapering sides placed between the teeth at each pair of flanges, releasable locking devices at the ends of the ring adapted to hold the ends together thereby forcing the teeth apart by the ring and drawing the abutting ends of the mines together, extensions on the locking devices, a flexible member passing over the mines, and enlarged portions on the flexible member adapted to engage the extensions on the locking devices, the flexible member being adapted to be pulled thereby releasing the locking devices, the enlarged portions being spaced at progressively increasing intervals so as to successively release the locking devices one after the other, the ring being adapted to spring clear from the teeth upon release of the locking device thereby permitting the end mine to fall away from the train.

LEONID A. DUNAJEFF.