June 8, 1943. B. H. RICE 2,321,515

HOLE PLUGGER FOR SHIPS AND THE LIKE

Filed Oct. 20, 1942

Fig. 1.

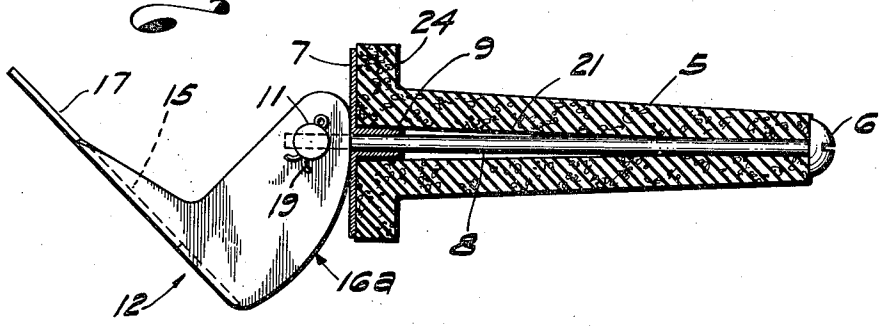
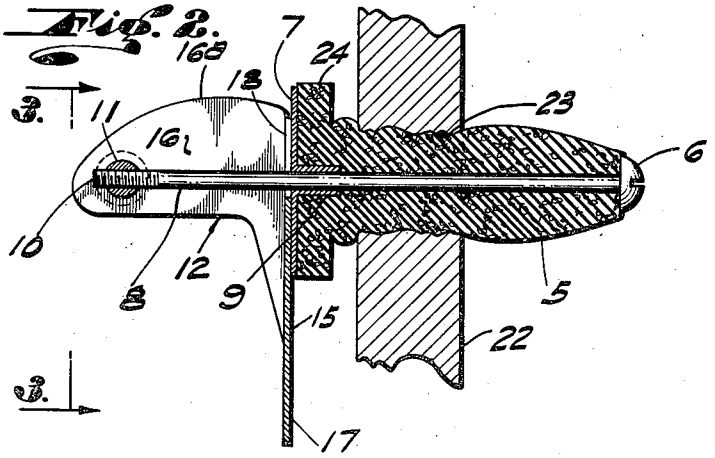


Fig. 2.



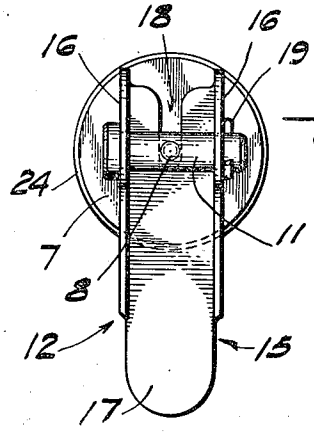


Fig. 3.

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HOLE PLUGGER FOR SHIPS AND THE LIKE

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13 Claims. (Cl. 114—227)

This invention relates to a hole plugger for ships and the like, more particularly for use to plug holes in life boats and other small ships.

One of the objects of the invention is to provide, as a part of a hole plugging device, an elongated, expansible plug body in combination with means for expanding said body in such a manner that the hole being plugged will not only be sealed in a cross-sectional manner but said expansible body will also be caused to seal the margins of the end portions of the hole, thus augmenting the positive action and dependability of the device.

One of the more specific objects of the invention is to provide a hole plugging device which will be valuable as an adjunct to the equipment of aviators in military service, who frequently find it necessary to descend upon the water in parachutes from disabled planes, or to land their planes upon water. Aviators placed in such a situation are provided with inflatable rubber boats usually of the double walled type and these boats are liable to be punctured by bullets, in which case it is important that the holes so made be promptly plugged to prevent sinking of the boats. This device is well adapted to be used to plug such holes in a quick, efficient manner. Also, during naval and military operations, it is frequently necessary for the crews of ships to abandon them and take to life boats and such boats are often punctured by the bullets of the enemy and thus caused to leak and to sink. Hitherto no means completely satisfactory has been provided to plug such holes in a quick and efficient manner. By this invention an inexpensive device has been produced to meet this need in a more satisfactory manner.

Other objects, advantages and features of invention will hereinafter appear.

Referring to the accompanying drawing, which illustrates what is at present deemed to be a preferred embodiment of the invention,

Fig. 1 is a view showing the cam element and anchor pin of the device in side elevation and the remaining parts in vertical midsection, the cam element being in its released or inoperative position.

Fig. 2 is a view of the same character as Fig. 1 except that the cam element is shown in the compressing, locked position and a fragment of a wall or plate is shown having through it a hole plugged by the device.

Fig. 3 is an elevation looking at the device from the line 3—3 of Fig. 2.

Referring in detail to the drawing, the main parts of the device shown are the elongated, tapered, expansible plug body 5 located between the abutment members 6 and 7, said abutment member 6 consisting of the head of a threaded rod or bolt 8, said rod projecting loosely through the hub portion 9 of the abutment plate 7. The threaded portion 10 of the projecting part of said rod is screwed into a threaded bore which passes diametrically through the central portion of a headed pivot pin 11 which is provided for the swingable cam member 12.

Said cam member 12 consists of an elongated base plate 15 having upstanding from each of its side edges a wing or flange 16, each of these wings having a cam edge 16a These wings are shown extending out to one end of the base plate 15 and thence a little more than two-thirds the length of the base plate, the remaining portion of the plate forming a convenient handle for the operator whereby the device can be manipulated. At one end said plate is shown having between said wings, at its mid-width a longitudinal slot 18 which admits the rod 8, thus permitting the cam member 12 to be forced down to the locking position thereof shown in Fig. 2 wherein it acts against the outer abutment member 7 and causes the two abutment members 6 and 7 to longitudinally compress, and therefore to diametrically expand, the elastic plug body 5.

The head of the cam pivot 11 abuts against the outer side of one of the cam wings 16 and said pivot is provided at its opposite end with a cotter pin 19 which engages the outer face of the other wing. Owing to the screwthreaded connection of said pin with the rod 8 these parts may be adjusted so as to materially vary the distance between the abutment 6 and said pivot pin, thus correspondingly varying the compression to which the plug body 5 is subjected when the cam member 12 is operated.

Said plug body 5 is shown of a frusto-conical shape having through it an axial passage 21 which at its outer end receives the hub 9 of the abutment plate 7 and thence, when the plug is uncompressed, is tapered through-out the greater portion of its length, the outer portion of said passage fitting closely around and being vulcanized or otherwise secured to the rod 8.

In Fig. 2 there is shown a fragment 22 of a ship wall having through it a bullet hole 23 plugged by the device. That end portion of the plug body which is contacted by the abutment plate 7 is shown provided with a thick circumferential flange or annular enlargement 24 which overlies the portion of the ship's wall around the aperture

to be plugged, thus aiding in forming a watertight seal.

The plug 5 will preferably be made of rubber, and while it is not essential that it be tapered yet this feature is deemed to be advantageous as the tapered plug can be closely fitted into bullet holes varying considerably in diameter.

By combining the curved cam edges 16a with the flat locking surface afforded by the outer face of the base plate 15 an efficient cam member is afforded which may initially be used strongly to press against the abutment plate 7 and then safely to lock said abutment plate in its depressed position wherein it efficiently expands the cross-sectional dimensions of the inserted plug body 5 and causes the latter to effectively close up a bullet hole and at the same time securely to maintain itself in place within the hole. The projecting portion 17 of the base plate 12 affords a handle means for operating the cam member 12.

Owing to the fact that the outer portion of the plug body 5 is vulcanized to the adjacent part of the rod 8 so that it cannot slip in relation thereto, the small end portion of said body will not crumple or spread out in a diametrical manner when inserted into a hole to be plugged, in such a forcible manner that, after relaxing the insertive force, its smaller projecting end will outswell around the far side of the hole. This can be done even though the hole be only slightly greater in diameter than the diameter of the small end of the plug or in fact even less because of the radial contractability of the elastic plug body. This feature aids in adapting the device for use in plugging long holes or in plugging by a single operation two holes in alinement with each other but spaced considerably apart. In either case, upon the operation of the cam member 12, the portion of the double hole or single long hole farthest from the cam member 12 will be closed around its outer end by an outswelled part of the plug body due to its longitudinal compression, and the mouth of the hole end adjacent to the plug flange 24 will likewise be closed by an outswelled part of the plug body (see Fig. 2); or if the hole is of a sufficiently large diameter the plug flange 24 will abut against the marginal portion of the adjacent hole end and form a seal therearound. If the hole to be plugged is slightly less in diameter than the normal diameter of the plug adjacent to said flange 24, the insertive movement of the plug will tend to circumferentially outswell the inner portion of the plug as shown in Fig. 2 adjacent said flange 24, the hub 9 of the plate 7 aiding in producing this outswell. Therefore said hub 9 augments the sealing function of the inserted plug.

In using the device to close up bullet holes in inflatable rubber life craft opposed walls having alined bullet holes through them may be brought into juxtaposition wherein the bullet holes match with each other and then the double hole may be plugged by the device in the manner already described.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the subject matter claimed.

What is claimed is:

1. In a hole plugger for ships and the like, an elongated expansible frusto-conical plug having through it an axial passage, said passage progressively tapering in cross section from the large end of the plug throughout the greater portion of the length thereof, a rod occupying said passage, one end portion of said rod projecting from one end of said passage, the opposite end portion of said rod being in a secured non-slip relation to the sides of the remaining untapered portion of said passage, said untapered portion of said passage being located adjacent to the smaller end of the plug, the intervening portion of the rod being in an unattached relation to said plug, a cam member carried by the projecting end portion of said rod, and an abutment member loosely surrounding said rod and located between said cam member and the large end of said plug to be forced thereagainst by the operation of said cam member whereby to expand the cross section of said plug into a sealing relation to the surfaces immediately surrounding each outer end of the hole being plugged.

2. The subject matter of claim 1 and, said abutment member including a hub portion projecting into the adjacent end of said passage, said rod passing through said hub portion with a working fit.

3. The subject matter of claim 1 and, said cam member consisting of a base plate having a flat portion and of two cam wings one extending rightangularly from each side edge of said base plate, said rod projecting into the space between said wings and said plate having at its mid-width a slot cut into one of its ends to admit the adjacent end portion of said rod when said cam member is swung to its extreme pressure exerting position, in which the position the flat portion of said base plate engages the adjacent abutment member in a flatwise manner and locks said cam member against accidental displacement.

4. The subject matter of claim 1 and, said cam member consisting of a base plate having a flat portion and of two cam wings one extending rightangularly from each side edge of said base plate, said rod projecting into the space between said wings and said plate having at its mid-width a slot cut into one of its ends to admit the adjacent end portion of said rod when said cam member is swung to its extreme pressure exerting position, in which position the flat portion of said base plate engages the adjacent abutment member in a flatwise manner and locks said cam member against accidental displacement, said base plate of said cam member having a free end portion which projects beyond said wings and provides a handle for the operation of the cam member.

5. In a hole plugger for ships and the like, an elongated diametrically expansible tapered plug furnished with an axial passage, a rod occupying said passage, one end portion of said rod projecting from the large end of said plug and the opposite end portion of the rod being in a secured non-slip relation to the portion of the plug thereabout, the intervening portion of the rod being in an unattached relation to said plug, a cam member secured to the projecting portion of said rod, and an abutment member against which said cam member acts simultaneously to shorten said plug and expand it diametrically.

6. The subject matter of claim 5 and, said abutment member having a hub portion projecting into the adjacent end of said passage, said rod passing loosely through said hub member.

7. In a hole plugger for ships and the like, an expansible elongated plug for insertion into a hole to be plugged, an abutment member abutting against each end of said plug, a rod extending longitudinally through said plug, said rod being

united to one of said abutment members and passing loosely through and projecting from the other of said abutment members, and a cam member swingably connected with the projecting portion of said rod, said cam member consisting of a base having a flat plate and of two cam wings one extending rightangularly from each side edge of said base plate, said rod projecting into the space between said wings and said plate having at its mid-width a slot cut into one of its ends to admit the adjacent end portion of said rod when said cam member is swung to its extreme pressure exerting position, in which position said flat portion of said base plate engages the adjacent abutment member in a flatwise manner and locks said cam member against accidental displacement.

8. The subject matter of claim 7 and, said base plate of said cam member having a free end portion which projects beyond said wings and provides a handle for the operation of the cam member.

9. In a hole plugger for ships and the like, an expansible frusto-conical plug for insertion into a hole to be plugged, said plug having through it an axial passage which tapers from the large end of said plug throughout the greater portion of the length thereof, a rod extending longitudinally through said passage, said rod having a head which abuts against said plug at the small end of said passage, an abutment member engaging the large end of said plug and having a hub extending a considerable distance into the adjacent end of said passage, said rod passing loosely through said hub and projecting therebeyond, and manually operable means connected with the projecting portion of said rod to press upon the adjacent abutment member to diametrically expand said plug.

10. The subject matter of claim 9 and, said plug having a flange or annular enlargement extending around the end thereof adjacent to said manually operable means to seal the surface adjacent to an end portion of a hole into which said plug is insertable.

11. In a hole plugger for ships and the like, an expansible elongated plug for insertion into a hole to be plugged, an abutment member abutting against each end of said plug, a rod passing longitudinally through said plug, said rod being united to one of said abutment members and passing loosely through and projecting from the other of said abutment members, and cam means connected with the projecting portion of said rod to exert a compressive action upon the adjacent abutment member to diametrically expand said plug, the abutment member which is adjacent to said cam member consisting of a plate having a hub portion which surrounds said rod and extends into the adjacent end portion of said plug a considerable distance to oppose contraction of the part of the plug which it occupies.

12. An elongated plug insertable into a hole to be plugged, a rod passing longitudinally through said plug and having a head abutting against one end thereof, the opposite end portion of said rod having screw threads, a pin diametrically into which said screwthreaded portion of said rod is screwed to the extent desired, a cam member swingably supported by the end portion of said pin, and an abutment member interposed between said cam member and the adjacent end of said plug to transmit pressure from said cam member to said plug.

13. In a hole plugger for ships and the like, a plug having through it a passage, a rod occupying said passage, projecting from one end thereof and being in a secured relation to a part of the plug surrounding the opposite end portion of said passage, a cam member secured to the projecting portion of said rod, and an abutment member against which said cam member acts simultaneously to shorten said plug and expand it diametrically, said cam member consisting of a base plate having a flat portion and of two cam wings one extending rightangularly from each side edge of said base plate, said rod projecting into the space between said wings and said plate having at its mid-width a slot cut into one of its ends to admit the adjacent end portion of said rod when said cam member is swung to its extreme pressure exerting position, in which position the flat portion of said base plate engages the adjacent abutment member in a flatwise manner and locks said cam member against accidental displacement, said base plate of said cam member having a free end portion which projects beyond said wings and provides a handle for the operation of the cam member.

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