

PATENT SPECIFICATION

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(54) COVER PLATE HAVING ADJUSTABLE LATCH MEANS

(71) We, MOBIL OIL CORPORATION, a Corporation organised under the laws of the State of New York, United States of America, of 150 East 42nd Street, New York, New York 10017, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a closure or cover plate for an opening and more particularly relates to a cover plate such as a "Butterworth cover" for sealing an opening through the deck of a cargo vessel.

In a typical marine vessel (e.g., an oil tanker) used for transporting fluid products, a plurality of large cargo tanks are positioned in the hull immediately below the deck. At least one relatively large opening is formed through the deck into each tank to provide a main entry into that tank. As is understood in the art, normally several additional, smaller openings are provided through the deck into each tank through which various service operations on the tanks and/or cargo can be carried out. When the service openings are not in use, they are normally sealed by removable cover plates, commonly referred to as "Butterworth covers".

Originally, a Butterworth cover was secured over a service opening by forming holes in the cover which fitted over studs fixed to the deck around the service opening and then threading nuts onto the studs. Besides requiring a substantial amount of time and effort to remove and replace a cover plate, the studs had a tendency to corrode and often required replacement. To alleviate such problems, quick-release cover plates were developed.

One such cover plate is disclosed in U.S. Patent 3,184,099, issued May 18, 1965. This cover plate incorporates a cammed latching means which secures or releases the cover plate to or from a deck opening with a simple turn of the latch. However, as recognized in U.S. Patent 3,184,099, the

thickness of the deck to which the cover plate is to be secured may vary from cargo vessel to cargo vessel. In order for a cover plate to find widespread utility, it must include some adjustable means to compensate for the various deck thicknesses. The cover plate of U.S. Patent 3,184,099 uses different sizes of shim washers on the shaft of the latch means for this purpose but the latch means has to be disassembled to rearrange the washers to adapt the cover plate for use with a particular deck thickness.

It is an object of the present invention to provide an easily removable cover plate for sealing an opening, e.g., the service opening through a deck of a vessel into a cargo tank, the cover plate having latch means which can be adjusted without disassembly to compensate for a wide range of different deck thicknesses, thereby making a single cover plate applicable for use on a variety of different cargo vessels.

According to the present invention, we provide a cover plate for closing an opening through a deck or the like, said cover plate comprising:

- a plate element slightly larger than said opening to be closed;
- a seal means on the underside of said plate element for cooperating with said deck or the like around said opening to prevent leakage around said cover plate when said cover plate is in an operable position; and
- a plurality of adjustable latch means spaced around and near the outer periphery of said plate element, each of said latch means comprising:
 - a shaft extending through and journaled to said plate element and having a threaded portion extending from the underside of said plate element;
 - a lock member threaded onto said threaded portion of said shaft, the periphery of said lock means having a substantially circular portion and a flattened side;
 - a lug attached to said lock member;

and
stop means extending from the under-
side of said plate element adjacent
said threaded portion of said shaft
whereby said lug will contact said
stop means when rotated in one
direction to hold said lock member
in an open position and to allow
said lock member to move down-
ward on said shaft and whereby said
lug will contact said stop means
when rotated in an opposite direction
to hold said lock means in a closed
position and to allow said lock
member to move upward on said
shaft.

Seal means are preferably provided
between each said shaft and plate element
to prevent leakage around the shaft. The
lower end of the shaft is preferably jour-
naled in a support which is secured between
two stop elements which in turn extend
from the underside of the plate element on
opposite sides of the shaft.

As indicated above, the lug attached to
each lock member contacts one of the stop
means to hold the lock member in an open
position and to move the lock member
downward on the shaft when the shaft is
rotated in the above-mentioned first direc-
tion. All of the lock members of the latch
means are intended to be moved down-
ward on their respective shafts to a distance
slightly greater than the thickness of the
deck or the like to which the cover plate is
to be secured.

The cover plate can then be positioned
over the opening in the deck or the like,
and the shafts of the latch means rotated
in the opposite direction. The lug on the
lock member now contacts the other of the
stop means to hold the latch means in a
closed position with a substantial portion
of the substantially circular periphery of
the lock member underlying the deck or
the like around the opening. Continued
rotation of all of the shafts will draw the
lock members up under the deck or the
like to compress the seal means carried by
the cover plate and to sealingly lock the
cover plate over the opening.

The actual construction, operation, and
manifest advantages of the present inven-
tion will be better understood by referring
to the accompanying drawings, in which
like numerals identify like parts and in
which:

FIG. 1 is a plan view of the cover plate
in accordance with the present invention;

FIG. 2 is an enlarged view, partly in sec-
tion, taken along section 2-2 of FIG. 1;

FIG. 3 is a slightly enlarged view taken
along section 3-3 of FIG. 2 and showing
the latching means in an open position;
and

FIG. 4 is a slightly enlarged view taken
along section 3-3 of FIG. 2 and showing
the latching means in a closed position.

Referring more particularly to the draw-
ings, FIGS. 1 and 2 disclose cover plate 10
in position over an opening 11 (FIG. 2) in
deck 12 or the like. As disclosed, opening
11 is a service opening through a deck and
into a cargo tank of an oil tanker and is
the type of opening normally closed by a
cover plate which is commonly known in
the industry as a "Butterworth cover".
Cover plate 10 is comprised of a plate
element 13 having a circumferential groove
13a on the underside thereof in which a
seal means, e.g. O-ring 13b, is positioned.
Seal means 13b cooperates with deck 12
when cover plate 10 is in position over
opening 11 to prevent leakage around plate
element 13. Plate element 13 has a plurality
of latch means 14 (three shown) preferably
spaced equidistantly from each other near
the outer periphery of plate element 13.

As shown in FIG. 2, each latch means 14
is comprised of a shaft 15 having a head
16 journaled in passage 17 through plate
element 13. Shaft 15 extends downward
from the underside of plate element 13 and
is threaded over most of its length. The
length of shaft 15 below plate element 13
is greater than the thickness T (FIG. 2) of
any deck 12 with which cover plate 10
will be used.

Seal means, e.g. an O-ring as shown, is
positioned in a groove shown in FIG. 2 on
head 16 of shaft 15, and cooperates with
passage 17 through plate element 13 to
prevent leakage around shaft 15. The lower
end 18 of shaft 15 is journaled in support
22 through passage 23 and is held in posi-
tion by means of washer 24 and a cotter
pin 25 or the like which passes through
end 18. Support 22 is secured by means
of screws 26 or the like to stop elements
27, 28, which, in turn, are secured to the
underside of plate element 13 and extend
downward on opposite sides of shaft 15 as
shown in FIGS. 2, 3, and 4. Stop elements
27, 28 are preferably cast as an integral
part of plate element 13 but can be secured
thereto by other means, e.g., welding.

A lock member 30 is threaded onto the
threaded portion of shaft 15. As best seen
in FIGS. 3 and 4, the periphery of lock
member 30 is formed basically of a circular
portion 31 and a flattened side 32. Attached
to and extending outward from circular
portion 31 is lug 33. The function of lock
member 30 will be described in detail in
the description of operation set out below.

As shown in FIG. 2, head 16 of shaft 15
is substantially level or flush with plate
element 13 and has a socket 16a formed
therein to receive a ratchet tool or other
operating tool for rotating shaft 15 in

either a clockwise or a counterclockwise direction, as will be explained below. Head 16 is preferably made level with plate element 13 in response to the normal marine requirements for a minimum of obstructions on a ship's deck. However, it should be recognized that other operating tools, e.g., a permanent or a removable handle, could be provided for shaft 15 without departing from the present invention.

The operation of cover plate 10 is as follows. An operating tool (not shown) is inserted into socket 16a on head 16, and shaft 15 is rotated counterclockwise (as viewed in FIG. 3). Lug 33 will contact stop element 27 and will prevent lock member 30 from further rotation. In this position, flattened side 32 will be substantially parallel to the edge 11a of opening 11 so latch means 14 will be held in an open position relative to opening 11. With lug 33 against stop 27, continued rotation of shaft 15 will cause lock member 30 to move downward on shaft 15 for a distance greater than the thickness T of deck 12. After lock members 30 of all of latch means 14 on cover plate 10 are in this position, cover plate 10 is positioned over opening 11 in deck 12 and shaft 15 is rotated clockwise as viewed in FIG. 4. This rotation also rotates lock member 30 until lug 33 contacts stop element 28. Now, a substantial portion of the circular portion 31 of lock member 30 will underlie deck 12 and latch means 14 will be in a closed position. Continued rotation of shaft 15 will cause lock member 30 to move upward into contact with the underside of deck 12. Slight additional rotation of shaft 15 will draw plate element 13 snugly into the deck to compress seal means 13b. This is repeated with all of the latch means 14 to sealingly lock cover plate 10 over opening 11. The operation is merely reversed to remove cover plate 10.

It can be seen that no special tools or additional parts are required to adapt the present cover plate for use with different deck thicknesses. By merely rotating shaft 15, lock member 30 can be moved to a variety of positions on shaft 15 to correspond to the wide range of deck thicknesses likely to be encountered on cargo vessels commonly in use. Rotating shaft 15 in an opposite direction will then quickly lock the cover plate in place.

WHAT WE CLAIM IS:—

1. A cover plate for closing an opening through a deck or the like, said cover plate comprising:

- a plate element slightly larger than said opening to be closed;
- a seal means on the underside of said plate element for cooperating with said deck or the like around said open-

ing to prevent leakage around said cover plate when said cover plate is in an operable position; and

a plurality of adjustable latch means spaced around and near the outer periphery of said plate element, each of said latch means comprising:

- a shaft extending through and journaled to said plate element and having a threaded portion extending from the underside of said plate element;

- a lock member threaded onto said threaded portion of said shaft, the periphery of said lock means having a substantially circular portion and a flattened side;

- a lug attached to said lock member; and

- stop means extending from the underside of said plate element adjacent said threaded portion of said shaft whereby said lug will contact said stop means when rotated in one direction to hold said lock member in an open position and to allow said lock member to move downward on said shaft and whereby said lug will contact said stop means when rotated in an opposite direction to hold said lock means in a closed position and to allow said lock member to move upward on said shaft.

2. The cover plate of claim 1 including: seal means between each said shaft and said plate element to prevent leakage around said shaft.

3. The cover plate of claim 2 wherein said seal means between each said shaft and said plate element comprises:

- a groove in said shaft element adjacent said plate element; and

- an O-ring seal carried by said groove.

4. The cover plate of claim 3 wherein said seal means on the underside of said plate element comprises:

- a circumferential groove extending around the underside of said plate element; and

- an O-ring seal carried by said groove.

5. The cover plate of claim 2 including: a head on said shaft substantially level with the upper side of said plate element; and

- means on said head for rotating said shaft.

6. The cover plate of claim 3 wherein said means for rotating said shaft comprises:

- a socket formed in said head adapted to receive an operating tool.

7. The cover plate of claim 2 wherein said stop means comprises:

- a pair of stop elements affixed to and



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either a clockwise or a counterclockwise direction, as will be explained below. Head 16 is preferably made level with plate element 13 in response to the normal marine requirements for a minimum of obstructions on a ship's deck. However, it should be recognized that other operating tools, e.g., a permanent or a removable handle, could be provided for shaft 15 without departing from the present invention.

The operation of cover plate 10 is as follows. An operating tool (not shown) is inserted into socket 16a on head 16, and shaft 15 is rotated counterclockwise (as viewed in FIG. 3). Lug 33 will contact stop element 27 and will prevent lock member 30 from further rotation. In this position, flattened side 32 will be substantially parallel to the edge 11a of opening 11 so latch means 14 will be held in an open position relative to opening 11. With lug 33 against stop 27, continued rotation of shaft 15 will cause lock member 30 to move downward on shaft 15 for a distance greater than the thickness T of deck 12. After lock members 30 of all of latch means 14 on cover plate 10 are in this position, cover plate 10 is positioned over opening 11 in deck 12 and shaft 15 is rotated clockwise as viewed in FIG. 4. This rotation also rotates lock member 30 until lug 33 contacts stop element 28. Now, a substantial portion of the circular portion 31 of lock member 30 will underlie deck 12 and latch means 14 will be in a closed position. Continued rotation of shaft 15 will cause lock member 30 to move upward into contact with the underside of deck 12. Slight additional rotation of shaft 15 will draw plate element 13 snugly into the deck to compress seal means 13b. This is repeated with all of the latch means 14 to sealingly lock cover plate 10 over opening 11. The operation is merely reversed to remove cover plate 10.

It can be seen that no special tools or additional parts are required to adapt the present cover plate for use with different deck thicknesses. By merely rotating shaft 15, lock member 30 can be moved to a variety of positions on shaft 15 to correspond to the wide range of deck thicknesses likely to be encountered on cargo vessels commonly in use. Rotating shaft 15 in an opposite direction will then quickly lock the cover plate in place.

WHAT WE CLAIM IS:—

1. A cover plate for closing an opening through a deck or the like, said cover plate comprising:
a plate element slightly larger than said opening to be closed;
a seal means on the underside of said plate element for cooperating with said deck or the like around said open-

ing to prevent leakage around said cover plate when said cover plate is in an operable position; and

a plurality of adjustable latch means spaced around and near the outer periphery of said plate element, each of said latch means comprising:

a shaft extending through and journaled to said plate element and having a threaded portion extending from the underside of said plate element;

a lock member threaded onto said threaded portion of said shaft, the periphery of said lock means having a substantially circular portion and a flattened side;

a lug attached to said lock member; and

stop means extending from the underside of said plate element adjacent said threaded portion of said shaft whereby said lug will contact said stop means when rotated in one direction to hold said lock member in an open position and to allow said lock member to move downward on said shaft and whereby said lug will contact said stop means when rotated in an opposite direction to hold said lock means in a closed position and to allow said lock member to move upward on said shaft.

2. The cover plate of claim 1 including: seal means between each said shaft and said plate element to prevent leakage around said shaft.

3. The cover plate of claim 2 wherein said seal means between each said shaft and said plate element comprises:

a groove in said shaft element adjacent said plate element; and

an O-ring seal carried by said groove.

4. The cover plate of claim 3 wherein said seal means on the underside of said plate element comprises:

a circumferential groove extending around the underside of said plate element; and

an O-ring seal carried by said groove.

5. The cover plate of claim 2 including: a head on said shaft substantially level with the upper side of said plate element; and

means on said head for rotating said shaft.

6. The cover plate of claim 3 wherein said means for rotating said shaft comprises:

a socket formed in said head adapted to receive an operating tool.

7. The cover plate of claim 2 wherein said stop means comprises:

a pair of stop elements affixed to and

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- extending from the underside of said plate element, said stop elements extending substantially parallel to and on opposite sides of said shaft.
- 5 8. The cover plate of claim 7 including: a support affixed to and extending between said two stop elements, the lower end of said shaft being journaled in said support.
- 10 9. The cover plate of claim 8 including: a head on said shaft substantially level with the upper side of said plate element; and
- 15 means on said head for rotating said shaft.
10. The cover plate of claim 9 wherein said means for rotating said shaft comprises: a socket formed in said head adapted to receive an operating tool. 20
11. A cover plate for closing an opening through a deck or the like, substantially as described and shown in the accompanying drawings.

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