

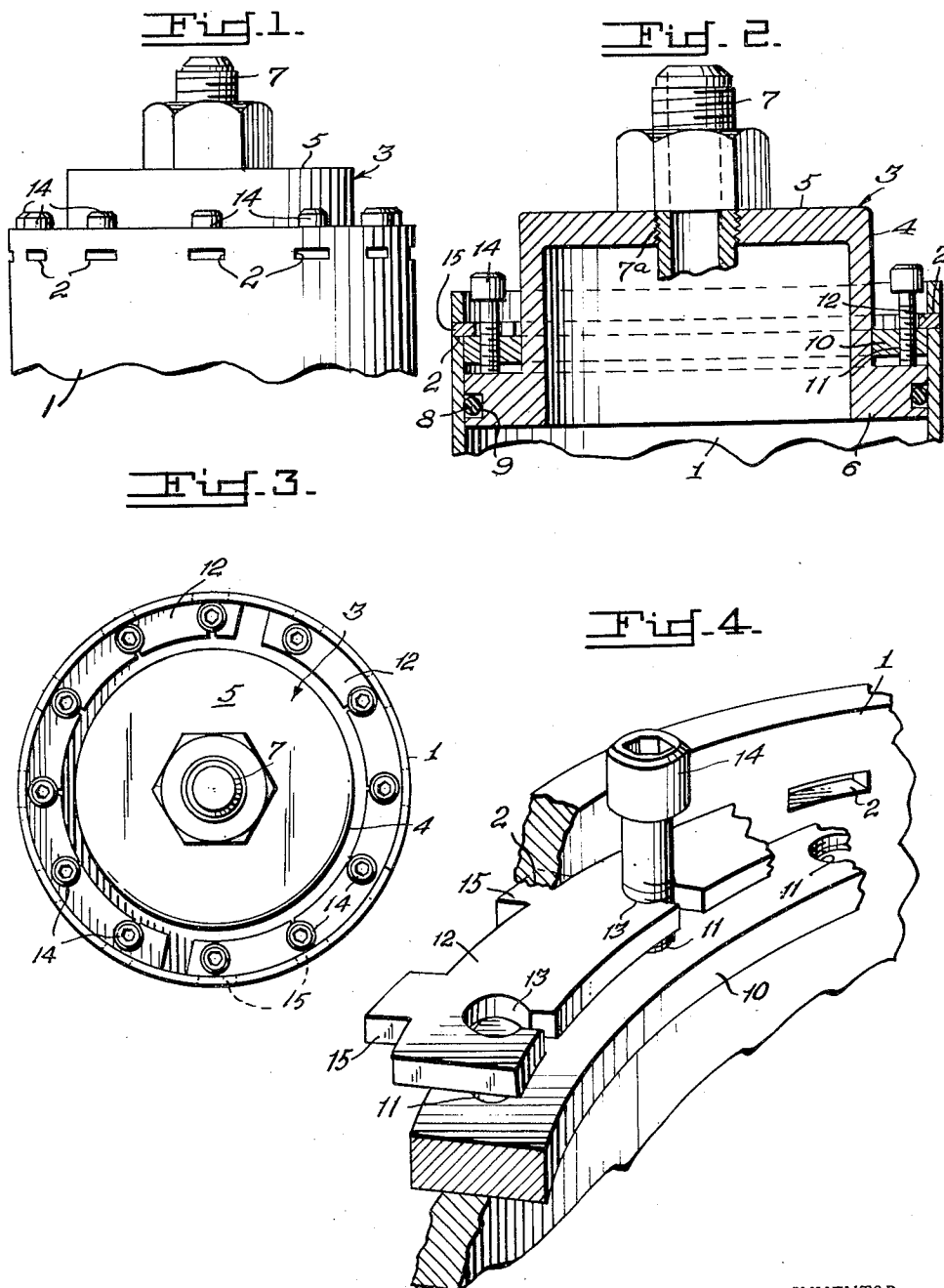
Dec. 18, 1956

J. E. LARSEN

2,774,508

MOTOR HEAD JOINT

Filed Dec. 10, 1954



INVENTOR.
John E. Larsen
BY
W. E. Shiboodeau & A. M. Dew
ATTORNEYS.

1

2,774,508

MOTOR HEAD JOINT

John E. Larsen, Schenectady, N. Y., assignor to the United States of America as represented by the Secretary of the Army

Application December 10, 1954, Serial No. 474,628

10 Claims. (Cl. 220-46)

This invention relates to a flangeless motor head joint, and more particularly to a means for holding and sealing of a motor tube head against gas pressure.

In devices of this type, it has heretofore been necessary to weld or otherwise provide a flange outside the motor tube to afford a circle of bolt holes to which the motor may be bolted. Such a construction is expensive, and furthermore increases the over-all diameter of the motor and also causes excessive weight. It is the purpose of this invention to overcome these objectionable features and to provide a sealing means on the inside of the motor tube.

It is therefore, a primary object of this invention to provide a strong gas-tight seal having no external flanges thereon.

A further object is to provide a gas-tight joint, light of weight, simple of construction and capable of being quickly assembled or dismantled.

It is still a further object of the invention to provide a joint capable of adjustment so that close tolerances on length of the motor tube are not necessary.

The specific nature of the invention as well as other objects and advantages thereof, will clearly appear from a description of a preferred embodiment as shown in the accompanying drawings in which:

Figure 1 is a fragmentary side elevational view illustrating a motor tube with a head joint constructed in accordance with the invention,

Figure 2 is an enlarged vertical sectional view illustrating the joint by which the head is secured to a motor tube,

Figure 3 is a top plan view thereof, and

Figure 4 is a perspective detail view to a greatly enlarged scale illustrating the construction of the joint.

Referring more particularly to the drawing wherein like reference characters designate like or corresponding parts throughout the different views, 1 indicates a motor tube having a series of spaced, circumferentially disposed slots 2, cut through its wall near the end thereof and shown as equally spaced and elongated in the circumferential direction, a tubular cap or closure member generally indicated as at 3 is adapted to slide snugly within said motor tube 1. This member comprises a cylindrical side wall portion 4 of less diameter than the motor tube 1, and has a top wall 5, forming a cap-like portion. An outwardly extending circular flange portion 6 is provided at the lower end of the cap-like portion and fits within the inner surface of tube 1. A coaxially disposed nozzle 7 is secured as by threading at 7a in the top wall 5. An O-ring sealing member 8 is seated in a peripheral groove 9 formed in the outer surface of the flange 6, providing a sealing medium between the cap member 3 and the inner surface of the wall of tube 1.

A shear ring 10 is provided and is adapted to fit between the wall 4 and the inner surface of the tube 1. This ring is provided with a series of spaced, vertically threaded holes 11 for a purpose to be described hereinafter. It is noted that these holes are equiangularly spaced and correspond in number with the slots 2. Arranged above the

2

shear ring is a pair of semi-circular snap ring segments 12 having spool openings 13 to register with threaded holes 11. Allen head cap screws 14 are provided to pass through openings 13 with a smooth fit and threadedly engaged in the threaded holes 11 of ring 4. The snap ring segments 12 are provided with radially extending ears 15 to fit within the spaced slots 2 when the parts are in assembled order.

To assemble the motor joint head, an O-ring 8 is placed in groove 9 on flange 6. The cap is then pushed into the tube 1 until the flange is at a sufficient distance below slots 2 for assembling the remaining parts. The shear ring 10 is placed on the flange 6 with each threaded hole 11 opposite a corresponding slot 2. The snap ring segments 12 are then placed over the shear ring, with ears 15 extending with slots 2. Then the screws 14 are passed through openings 13 and are threaded through holes 11 in shear 10 and are turned until their ends contact flange 6 and the latter is at the proper or desired distance from the end of tube 1. Thus, all end thrust is conveyed from cap 3 to screws 14 and thence to shear ring 10, snap ring segments 12 and tube 1. Due to the fact that ears 15 can be given a large cross sectional area subject to pure shear and slots 2 placed a desired distance or spacing axially from the end of tube 1, the joint may be made as strong as desired, with a minimum of material and consequent relatively light weight for any desired maximum end thrust on cap 3. Thus, for example, the total cross sectional area of ears or lugs 15 at their juncture with segments 12 may be made substantially equal to the total area intercepted on tube 1 between slots 2 and the end of the tube, by radial planes through the axis of the tube and the ends of the slots so that, assuming equal ultimate shear of the metals, a very strong joint may be made with a minimum of metal. Tension appears only in the walls 4.

Furthermore, the joint forming the subject of this invention, in view of the absence of external flanges, greatly facilitates packaging and storage in quantities and is easily assembled. If desired, the parts may be proportioned so that any failure will occur between ears 15 and the body of segments 12. As these are inexpensive and easily fabricated, any joint damaged by failure may be easily and inexpensively repaired.

While a preferred form of the invention has been shown and described, various modification and substitution of equivalents will occur to those skilled in the art after a study of the foregoing disclosure. Hence, the disclosure should be taken in an illustrative rather than a limiting sense, and it is the desire and intention to reserve all modifications within the scope of the subjoined claims.

Having fully disclosed the invention what I claim as new and desire to secure by Letters Patent is:

1. In a closure for a motor casing having a plurality of circumferentially-spaced apertures in its wall adjacent a tubular end thereof, a closure member including a peripheral flange fitting said tubular end, a shear ring fitting said tubular end axially outwardly of said flange, a snap ring comprising a plurality of discrete segments and fitting said tubular end axially outwardly of said shear ring, said snap ring including a plurality of radially outwardly projecting lugs each passing into a corresponding one of said apertures, and a plurality of screws threaded through said shear ring in circumferentially-spaced relation and adapted to engage said flange at their axially inward ends.

2. In a closure for a motor head having a plurality of circumferentially spaced apertures in its wall adjacent a tubular end thereof, a head including a peripheral flange fitting inside said tubular end, a shear ring fitting inside said tubular end outwardly of said flange, a plurality of arcuate snap ring segments fitting said tubular end outwardly of said shear ring, said segments having radially

outwardly projecting ears each removably engaged within a respective aperture of said head, and a plurality of screws threaded through said shear ring and engaging said peripheral flange.

3. A closure as recited in claim 2, said aperture being equiangularly spaced, each said screw being disposed in the corresponding radial line from the axis of said tubular end to a respective ear.

4. A closure as recited in claim 2, each said screw passing freely through a corresponding one of a plurality of holes in said snap ring segments.

5. In a closure for a motor head having a plurality of equiangularly circumferentially spaced holes through its wall adjacent a tubular end thereof, a closure head including a peripheral flange fitting within said tubular end, a shear ring fitting within said tubular end axially outwardly of said flange, a pair of snap ring segments each of 180° angular extent and fitting within said tubular end axially outwardly of and in face-to-face contact with said shear ring, said segments having radially outwardly protruding ears each passing into a respective one of the holes in said tubular end, and a plurality of screws each passing freely through a respective hole in said snap ring segments and threaded through a respective hole in said shear ring into contact with said peripheral flange.

6. A closure as recited in claim 5, each said screw being positioned in a corresponding radial line from a respective one of said ears to the axis of said tubular end.

7. In a closure for a motor head having a plurality of equiangularly and circumferentially disposed slots through its wall adjacent a tubular end thereof, a closure head including a peripheral outwardly projecting circular flange fitting into said tubular end, a shear ring fitting said tubular end axially outwardly of said closure head, a pair of semi-circular snap ring segments fitting in end-to-end relation within said tubular end axially outwardly of and in contact with said shear ring, said segments having radially outward projections each extending into a respective one of said slots, and a plurality of screws each passing freely through a respective one of a series of holes in said segments and threadedly engaging a respective one of a series of holes in said shear ring, said screws being turnable to project through said shear ring and engage said flange whereby said head is held against outward movement and in axially adjustable position with respect to said tubular end.

8. In a flangeless motor head joint including a motor tube having a series of spaced slots cut therein, a head member having a flange adapted to fit snugly within said motor tube, a shear ring adapted to fit said tube, a pair

of semi-circular snap ring segments provided with a series of spaced, radially extending ears each adapted to enter a respective one of said slots in said tube, and a series of adjusting screws passing through openings in said snap ring segments and engaged in threaded holes in said shear ring to contact said flange.

9. In a motor head seal a tube having a series of circumferentially spaced apertures in its wall near one end thereof, a tubular head member comprising a cap portion and an outwardly extending circular flange integral with said cap portion, said flange having a diameter substantially the same as the internal diameter of said tube, said flange having a channel formed in the periphery of its cylindrical surface an O-ring adapted to fit within said channel and forming a sealing means between said flange and the inner wall of said motor tube, a shear ring having a plurality of circumferentially spaced threaded bores formed therein, a pair of semi-circular snap ring segments having circumferentially spaced openings formed therein, said segments provided with outwardly extending ears integral to the outer periphery of said snap ring segments, each said ears being disposed within a respective aperture in said tube, and cap screws passing through openings in said segments and threadedly engaged in the threaded holes in said shear ring to bear against the upper surface of said flange and maintain said head member against axial movement outwardly of said one end.

10. In a flangeless motor head joint including a motor tube having a series of spaced slots provided near its end thereof, a tubular cap member, flanged outwardly at its lower end thereof, said cap member adapted to slide snugly within said motor tube, sealing means between said tube and said cap member, carried by the outer peripheral face of said flange, a pair of semi-circular snap ring segments provided with radially extending ears integral therewith, said ears adapted to register with said slots in said motor tube, a shear ring interposed between said flange and said snap rings and adjustable means carried by said shear ring for securing said assembly.

References Cited in the file of this patent

UNITED STATES PATENTS

1,295,879	Flannery et al. _____	Mar. 4, 1919
1,767,217	Kraft _____	June 24, 1930
2,223,320	Jacocks _____	Nov. 26, 1940
2,226,494	Jacocks _____	Dec. 24, 1940
2,237,029	Fischer _____	Apr. 1, 1941
2,278,881	Jacocks _____	Apr. 7, 1942
2,385,754	Baker _____	Sept. 25, 1945
2,636,637	Powers _____	Apr. 28, 1953