

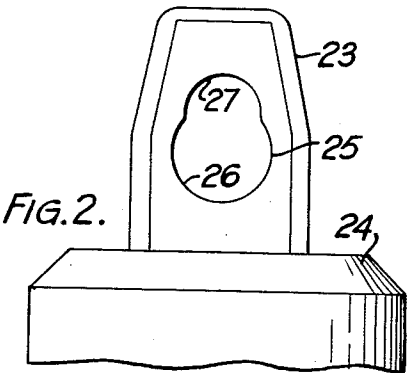
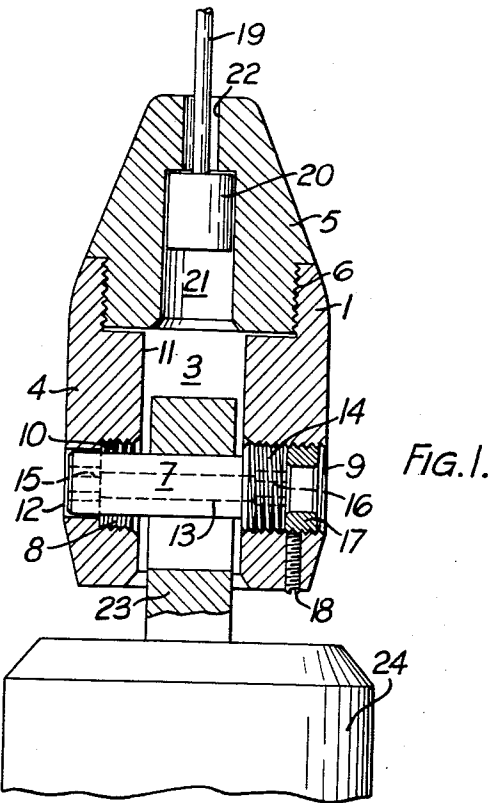
Oct. 11, 1960

J. K. JOBBINS

2,955,855

SHACKLES

Filed May 10, 1957



JOHN KENNETH JOBBINS

Inventor

Larson and Taylor

Attorneys

1

2,955,855

SHACKLES

John Kenneth Jobbins, Sale, England, assignor to United Kingdom Atomic Energy Authority, London, England

Filed May 10, 1957, Ser. No. 658,317

Claims priority, application Great Britain May 23, 1956

4 Claims. (Cl. 287—91)

This invention relates to shackles suitable amongst other things for carrying a control rod in a nuclear reactor.

It is an object of the present invention to provide a shackle which is simply locked when load carrying, which can be operated by a single remotely operated tool and which has its shackle pin firmly retained in the shackle when the shackle is open to receive or release its load.

According to the invention a shackle has a shackle pin in the form of a screwed head and a shank of smaller diameter than the head, means providing for rotation of the shackle pin, and shackle pin holes formed so that the hole in one side of the shackle is threaded for the head of the pin and the hole in the other side is in two parts, namely, an inner part threaded for the head of the shackle pin and an outer part of smaller diameter than the threaded part for the shank of the pin.

A shackle in accordance with the invention will now be described with reference to the accompanying drawing. In the drawing:

Fig. 1 is a sectional elevation of the shackle.

Fig. 2 is an elevation of a member suitable for coupling a load into the shackle.

Referring to Fig. 1 a shackle 1 is in the form of a body of circular section having a cavity 3 of rectangular section. The body is in two parts, a cylindrical part 4 having the cavity 3 and an end cap 5 which screws into a threaded hole 6 in one end of the part 4. A shackle pin 7 is located in the body part 4 in shackle pin holes 8 and 9. The hole 8 has a threaded part 10 open to the inside of the face 11 of the cavity 3 and connecting with an unthreaded co-axial part 12 of smaller circular cross-section extending to the outside of the cylindrical part 4. The hole 9 which extends from the opposite face of the cavity 3 to the outside of the part 4, is threaded throughout and is of the same thread as the part 10 of the hole 8. The shackle pin 7 has a shank 13 of circular cross-section and an externally threaded head 14 of larger diameter than the shank 13. The shackle pin 7 has a socket 15 of hexagonal section in the end of the shank 13 and a similar socket 16 in the end of the head 14. The sockets 15 and 16 provide engagement for a tool to rotate the shackle pin 7. The pin 7 has its head 14 screwed into the hole 9 and its shank in the part 12 of the hole 8 in which it has a sliding fit. A plug 17 in the form of an externally threaded ring screws into the hole 9 and is located in a fixed position by a grub screw 18.

The shackle 1 is supported from a flexible lifting cable 19 having a ferrule 20, the ferrule 20 resting in a hole 21 in the end cap 5. The cable 19 passes out of the end cap 5 through a hole 22. The pin 7 is shown supporting in the cavity 3, a lifting eye 23 formed integral with a control rod attachment head 24. Referring to Fig. 2, the lifting eye 23 is in the form of a plate of rectangular cross-section having a hole 25. The hole 25 has a major

2

circular part 26 with a minor part 27 of smaller radius connecting with it.

The use of the shackle will now be described with reference to the shackling and unshackling of a lifting cable and a control rod of a nuclear reactor. Starting from a point where the shackle 1 is suspended from the cable 19 above the eye 23 and with the shackle pin 7 in the "carrying" position shown in Fig. 1. A long hexagonal rod is engaged with the socket 16 in the head 14 of the shackle pin 7 to rotate the pin 7 so that its head 14 is unscrewed from the hole 9. After unscrewing the head 14 of the pin 7 from the hole 9 the pin 7 is pushed by means of the engaged hexagonal rod until the head 14 engages with the threaded part 10 of the hole 8 into which it is then screwed. The shackle 1 is now lowered by the cable 19 onto the lifting eye 23 which enters the cavity 3 of the shackle 1 and the shackle 1 comes to rest on the control rod attachment head 24. When the shackle is in this position the major part 26 of the hole 25 in the lifting eye 23 is situated adjacent to the head 14 of the shackle pin 7. The hexagonal rod is now engaged with the socket 15 of the pin 7 and the pin 7 is rotated to screw the head 14 out of the part 10 of the hole 8 in the shackle 1. When the head 14 is unscrewed the pin 7 is pushed by means of the engaged hexagonal rod so that its head 14 passes through the major part 26 of the hole 25 in the eye 23 and engages with the hole 9 in the shackle 1 into which it is then screwed until the head 14 comes up against the fixed plug 17. The shackle 1 is now raised by means of the cable 19 and there is relative movement between the shackle 1 and the lifting eye 23 until the shank 13 of the shackle pin 7 bears against the surface of the minor part 27 of the hole 25 in the lifting eye 23, when lifting of the control rod can take place. The head 14 of the loaded shackle pin 7 is prevented from unscrewing completely from the hole 9 by the face of the eye 23.

Detachment of the shackle is carried out by performing the above sequence of operations in the reverse sense.

I claim:

1. A shackle comprising a tubular body, a first and a second hole opposingly disposed therein, said first hole being uniformly threaded throughout and having a first diameter, the inner portion of said second hole being correspondingly threaded with said first hole and having a first diameter, the outer portion of said second hole having a second diameter smaller than said first diameter, a pin disposed in said first and second holes and having a head of said first diameter and a shank approximating said second diameter, said head being correspondingly threaded with said first hole, and means on said head and the free end of said shank for rotating said pin, whereby said head alternatively engages said first hole and said inner portion.

2. A shackle according to claim 1 in combination with a lifting eye inserted within said body and having a major hole therethrough of said first diameter and a minor hole of said second diameter joining said major hole, whereby, upon insertion of said eye within said body, said head is unthreaded from said inner portion, passed through said major hole, and threaded into said first hole, and said eye and shackle are displaced relatively until said shank engages said minor hole.

3. A shackle according to claim 1 wherein said means comprises sockets in said head and said free end in which a tool is inserted for rotation of said pin.

4. A shackle according to claim 1 further comprising an annular plug locked in the outer portion of said first hole.

(References on following page)

References Cited in the file of this patent

UNITED STATES PATENTS

| | | |
|-----------|------------|--------------|
| 679,889 | Dorn | Aug. 6, 1901 |
| 843,081 | Fitzgerald | Feb. 5, 1907 |
| 1,262,300 | Blake | Apr. 9, 1918 |
| 1,634,318 | Bull | July 5, 1927 |

| |
|-----------|
| 2,010,853 |
| 2,046,571 |
| 2,090,569 |
| 2,177,816 |
| 2,548,089 |
| 2,748,824 |

5

| | |
|---------|---------------|
| Dyer | Aug. 13, 1935 |
| McCain | July 7, 1936 |
| Bagley | Aug. 17, 1937 |
| Wertman | Oct. 31, 1939 |
| Wycosky | Apr. 10, 1951 |
| Brill | June 5, 1956 |