June 17, 1958 L. J. ROUSSEL 2,839,164

SLIP CONSTRUCTION

Filed April 9, 1956

Fig. 1

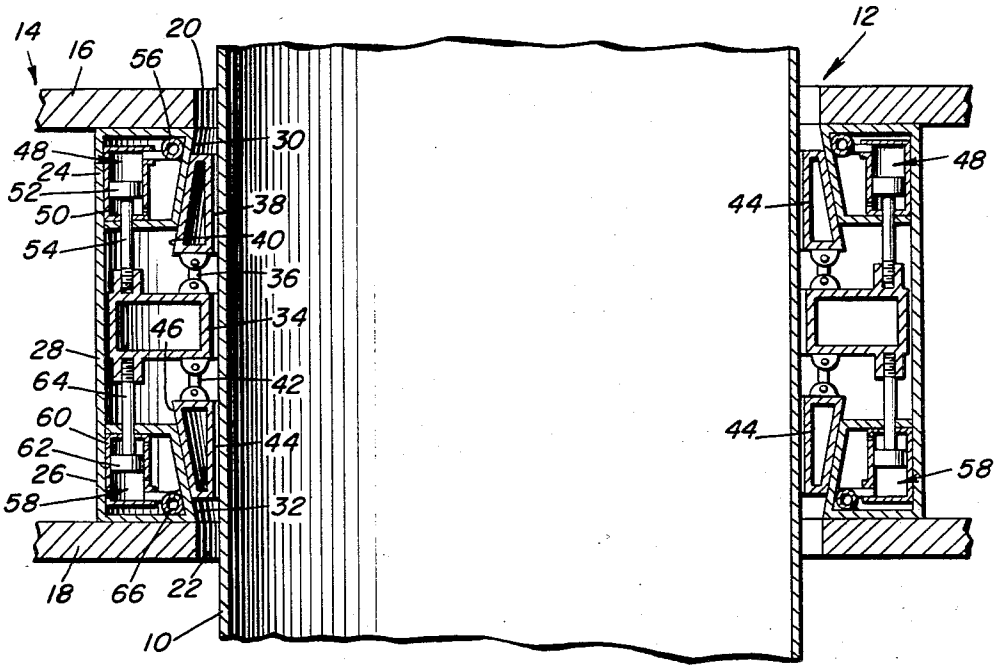
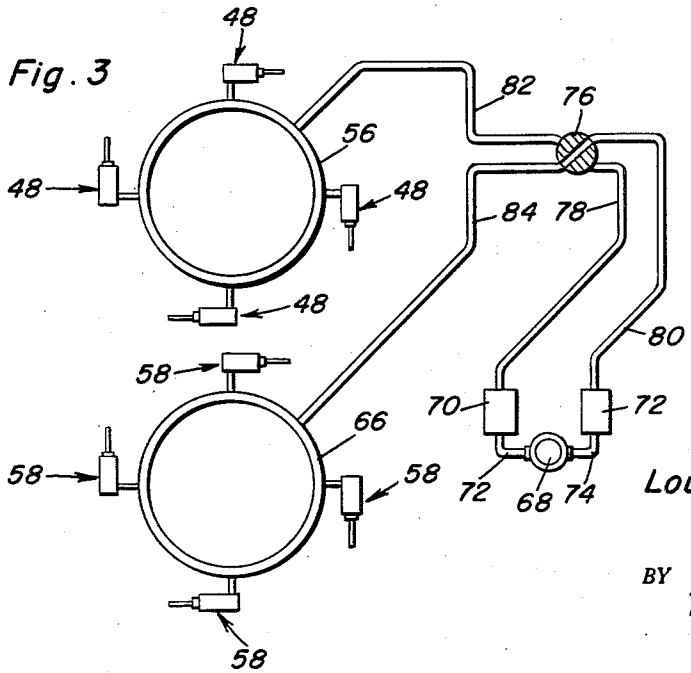


Fig. 3



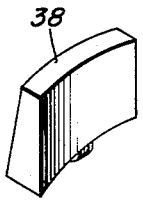


Fig. 2

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2,839,164

Patented June 17, 1958

2,839,164

SLIP CONSTRUCTION

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Application April 9, 1956, Serial No. 576,978

5 Claims. (Cl. 188—67)

This invention relates in general to new and useful improvements in slip construction, and more specifically to an improved slip construction for use in conjunction with a caisson.

In order to support barge like working platforms in elevated positions for supporting offshore drilling rigs, there are carried by the platforms a plurality of caissons. The caissons are releasably connected to the platforms by a suitable jaw construction in order that the platform may be moved relative to the caissons. Such a barge construction is disclosed in my copending application Serial No. 568,761, filed March 1, 1956.

In order to facilitate the construction of the caissons and also reduce the cost thereof, it is highly desirable that the caissons be of a smooth skin construction. However, inasmuch as the connection between the caissons and the platform must transmit a relatively heavy load, it is necessary that the connections be of such a nature whereby relative movement between the caissons and the platform is prevented. It is therefore the primary object of this invention to provide an improved slip construction which is suitable for use in conjunction with caissons for locking the caissons against relative vertical movement.

Another object of this invention is to provide an improved slip construction which includes a supporting frame intended to be suitably carried by a platform against movement, the supporting frame supporting a pair of vertically spaced bowls, there being associated with each of the bowls a plurality of slips, the slips being carried by an intermediate slip support and there being provided means for vertically shifting the slip support to selectively wedge the slips between the bowls in the caisson to lock the caisson relative to the supporting frame.

A further object of this invention is to provide an improved slip construction for locking caissons against movement, the slip construction including vertically spaced hollow bowls, there being disposed between the bowls a slip support, a plurality of slips pivotally carried by the slip support for vertical movement therewith for selective wedging between a caisson and the bowls, the bowls having mounted therein means for vertically shifting the slip support as desired.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawing forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a vertical sectional view taken through an intermediate portion of the caisson and shows the relationship of the slip construction, which is the subject of this invention, with respect to the caisson, and slips being in released positions;

Figure 2 is a perspective view of one of the individual slips; and

Figure 3 is a hydraulic diagram for the means for operating the slip construction.

Referring now to the drawings in detail, it will be seen

that there is illustrated in Figure 1 an intermediate portion of a caisson 10. The caisson 10 is intended to support a platform or the like by being interlocked to such a platform as set forth in my aforementioned copending application.

In order that the caisson 10 may be locked against relative vertical movement, there is provided an improved slip construction which is referred to in general by the reference numeral 12. The slip construction 12 includes a supporting frame, which is referred to in general by the reference numeral 14. The supporting frame 14 is formed of an upper plate 16 and a lower plate 18 which will be suitably mounted on the platform (not shown). The plate 16 is provided with an enlarged opening 20 aligned with a similar opening 22 in the plate 18. The caisson 10 passes through the openings 20 and 22.

Secured to the underside of the plate 16 is an upper bowl 24. A similar bowl 26 is secured to the upper face of the plate 18. The bowls 24 and 26 are connected together by an annular plate 28.

The bowl 24 includes an inner peripheral surface 30 which slopes upwardly and inwardly. The bowl 26 includes an inner annular peripheral surface 32 which slopes downwardly and inwardly. The surfaces 30 and 32 are spaced a suitable distance from the external periphery of the caisson 10.

Disposed intermediate the bowls 24 and 26 is an annular slip support 34. Extending upwardly from the slip support 34 at circumferentially spaced intervals are pivotally mounted links 36 to which there are pivotally mounted links 36 to which there are pivotally connected upstanding upper slips 38. The slips 38 are arcuate in outline and include outer tapered faces 40.

Extending downwardly from the slip support 34 in circumferentially spaced relation is a plurality of links 42. Pivotally carried by the links 42 are lower slips 44 having tapered outer surfaces 46. It is to be noted that the slips 38 and 44 are identical, but are positioned in reverse of each other. It is also to be noted that the bowls 24 and 26 are identical, but are reversely mounted.

The slips 38 and 44 are of such proportions whereby when engaged with their respective bowls 24 and 26, they are spaced slightly from the caisson 10. However, by vertically moving the slip support 34 upwardly, the slips 38 will become wedged between the bowl 24 and the caisson 10. When the slips 38 are in this position, the caisson 10 is prevented from moving upwardly with respect to the supporting frame 14. At this time the slips 44 are freely suspended between the bowl 26 and the caisson 10 and have no function.

When it is desired to prevent the caisson 10 from moving downwardly with respect to the supporting frame 14, the slip support 34 is moved downwardly to wedge the slips 44 between the bowl 26 and the caisson 10. It is to be noted that the movement of the slips 38 and 44 into wedged positions is that direction which it is desired to prevent the caisson 10 from moving. Thus any attempt on the part of the caisson 10 to move once the slips 38 and 44 have been set will result in the urging of the slips 38 and 44 to positions of greater locking pressure.

In order that the support 34 may be selectively vertically positioned to set the slips 38 and 44, there is carried by the bowl 24 within the interior thereof a plurality of fluid motors 48, the fluid motors 48 being circumferentially spaced. Each of the fluid motors 48 includes a cylinder 50 having mounted therein a piston 52. Extending downwardly from the piston 52 and suitably connected to the support 34 is a piston rod 54. Suitably mounted in the upper part of the bowl 24 is a circular fluid line 56 which is connected to the upper part of each of the cylinders. Thus when fluid is introduced into the fluid line 56, the pistons 52 are driven downwardly to set the slips 44,

Mounted within the bowl **26** in opposed relation to the fluid motors **48** is a plurality of circumferentially spaced fluid motors **58**. Like the fluid motors **48**, each fluid motor **58** includes a cylinder **60** having mounted therein a piston **62**. Extending between the pistons **62** and the slip support **34** and suitably connected to the slip support **34** is a piston rod **64**. Mounted in the lower part of the bowl **26** is a circular fluid line **66** which is communicated with the lower end of each cylinder **60**. Thus when fluid is placed under pressure in the fluid line **66**, the pistons **62** are urged upwardly to move the slip support **34** upwardly to set the slips **38**.

Referring now to Figure 3 in particular, it will be seen that in order to control the operation of the fluid motors **48** and **58**, there is provided a fluid pump **68**. The fluid pump **68** is connected to a supply reservoir **70** by means of a pipe **72**. The motor **68** is also connected to a pressure reservoir **73** by means of a pipe **74**. A suitable valve **76** is provided for controlling the flow of fluid to and from the fluid lines **56** and **66**. Connecting the fluid reservoirs **70** and **73** to the valve **76** are fluid lines **78** and **80** respectively. Connecting the valve **76** to the fluid lines **56** and **66** are pipes **82** and **84**. Because of the particular construction of the valve **76**, it will be seen that when the fluid line **66** is pressurized, the fluid line **56** is connected to the supply reservoir **70** for exhausting fluid from the individual fluid motors **48**. When the valve **76** is turned substantially 90°, the relationship is reversed. Thus while the fluid motors **48** and **58** are in opposed relation, they function together.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A slip construction for locking caissons in position, said slip construction comprising a supporting frame, vertically spaced fixed annular bowls carried by said supporting frame, said bowls including a lower bowl having a downwardly and inwardly sloping inner peripheral surface, and an upper bowl having an upwardly and inwardly sloping surface, a caisson freely passing through said bowls in spaced relation to said surfaces, a slip support disposed between said bowls for vertical movement, upper and lower slips pivotally carried by said slip support in engagement with said surfaces, and means supported by said supporting frame and connected to said slip support for vertically shifting said slip support to selectively wedge said slips between said bowls and said caisson to prevent movement of said caisson relative to said supporting frame, said supporting frame including upper and lower load receiving plates directly overlying and directly underlying said upper bowl and said lower bowl, respectively.

2. A slip construction for locking caissons in position, said slip construction comprising a supporting frame, vertically spaced fixed annular bowls carried by said supporting frame, said bowls including a lower bowl having a downwardly and inwardly sloping inner peripheral surface, and an upper bowl having an upwardly and inwardly sloping surface, a caisson freely passing through said bowls in spaced relation to said surfaces, a slip support disposed between said bowls for vertical movement, upper and lower slips pivotally carried by said slip support in engagement with said surfaces, and means supported by said supporting frame and connected to said slip support for vertically shifting said slip support to selectively wedge said slips between said bowls and said caisson to prevent movement of said caisson relative to said supporting frame, said means being directly carried by said bowls.

3. A slip construction for locking caissons in position, said slip construction comprising a supporting frame, vertically spaced fixed annular bowls carried by said supporting frame, said bowls including a lower bowl having a downwardly and inwardly sloping inner peripheral surface, and an upper bowl having an upwardly and inwardly sloping surface, a caisson freely passing through said bowls in spaced relation to said surface, a slip support disposed between said bowls for vertical movement, upper and lower slips pivotally carried by said slip support in engagement with said surfaces, and means supported by said supporting frame and connected to said slip support for vertically shifting said slip support to selectively wedge said slips between said bowls and said caissons to prevent movement of said caisson relative to said supporting frame, said means being mounted within said bowls and projecting therefrom.

4. A slip construction for locking caissons in position, said slip construction comprising a supporting frame, vertically spaced fixed annular bowls carried by said supporting frame, said bowls including a lower bowl having a downwardly and inwardly sloping inner peripheral surface, and an upper bowl having an upwardly and inwardly sloping surface, a caisson freely passing through said bowls in spaced relation to said surface, a slip support disposed between said bowls for vertical movement, upper and lower slips pivotally carried by said slip support in engagement with said surfaces, and means supported by said supporting frame and connected to said slip support for vertically shifting said slip support to selectively wedge said slips between said bowls and said caissons to prevent movement of said caisson relative to said supporting frame, said means being directly connected to said bowls and including fluid motors mounted in said bowls.

5. A slip construction for locking caissons in position, said slip construction comprising a supporting frame, vertically spaced fixed annular bowls carried by said supporting frame, said bowls including a lower bowl having a downwardly and inwardly sloping inner peripheral surface, and an upper bowl having an upwardly and inwardly sloping surface, a caisson freely passing through said bowls in spaced relation to said surfaces, a slip support disposed between said bowls for vertical movement, upper and lower slips pivotally carried by said slip support in engagement with said surfaces, and means for vertically shifting said slip support to selectively wedge said slips between said bowls and said caissons to prevent movement of said caisson relative to said supporting frame, said means being in the form of fluid motors mounted in said bowls, said fluid motors being mounted in opposed relation and having piston rods extending from said bowls and connected to said slip support.

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