June 17, 1958 L. J. ROUSSEL 2,838,915

REMOVABLE PONTOON MOUNTING

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Fig. 3

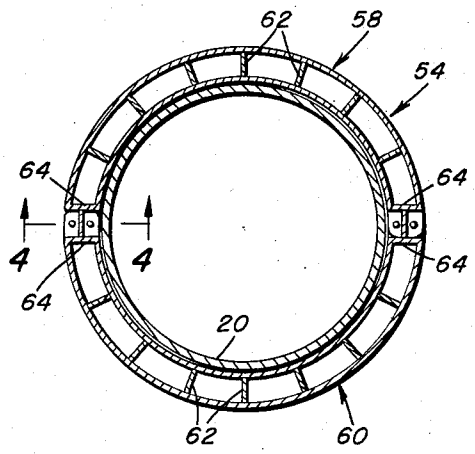


Fig. 1

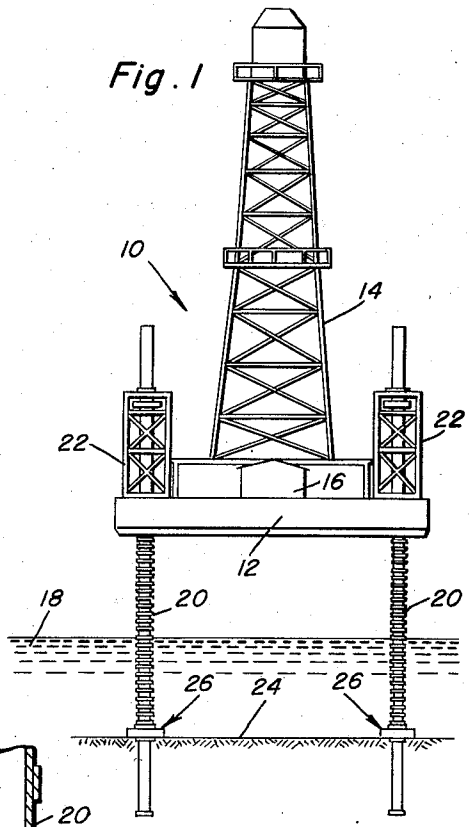
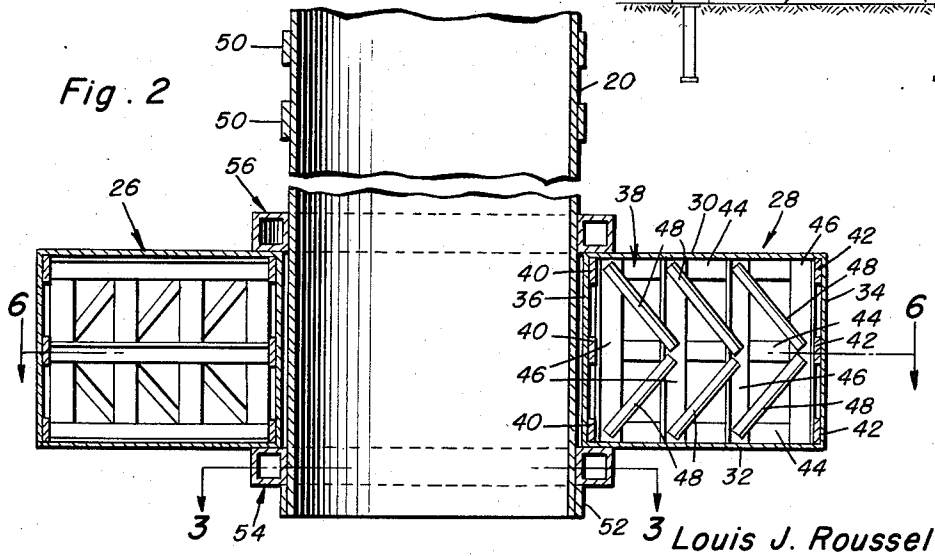


Fig. 2



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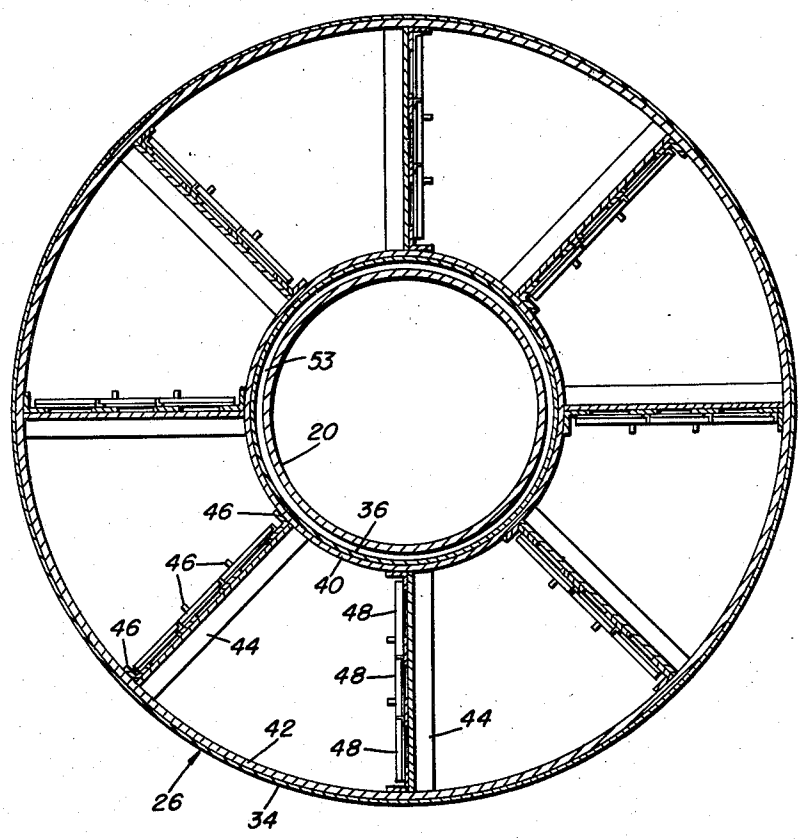
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Fig. 6



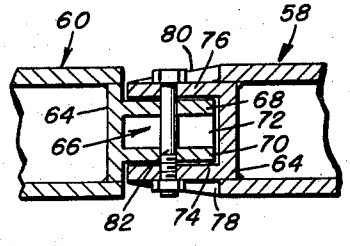


Fig. 5

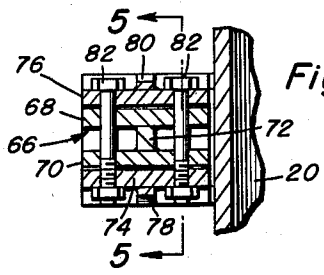


Fig. 4

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REMOVABLE PONTOON MOUNTING

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Application April 9, 1956, Serial No. 576,979

3 Claims. (Cl. 61—46.5)

This invention relates in general to new and useful improvements in offshore drilling platforms, and more specifically to a removable pontoon mounting for use in conjunction with a caisson.

In my copending application Serial No. 568,761, filed March 1, 1956, there is described an offshore drilling platform which includes a barge supported by a plurality of caissons. The caissons are provided at the lower ends thereof with suitable bearing plates so as to increase the load which may be applied to the individual caissons. The bearing plates have two major disadvantages. One, once the bearing plates have penetrated to the bottom of the body of water in which the platform is positioned, material of the bottom covers the bearing plate and greatly hampers the removal of the caissons when it is desired to move the platform. Secondly, the bearing plates prevent the complete withdrawal of the caissons so that at least a portion of each caisson depends below the barge which forms the major part of the platform. Thus this reduces the shallow water areas over which the barge may pass due to the resultant increase in draft.

It is therefore the primary object of this invention to provide a removable pontoon assembly for use in conjunction with caissons to increase the bearing capacity of such caissons, the pontoons being so mounted whereby they may be completely removed from the caissons in order that the caissons may be completely withdrawn within the barge or platform of which they are a part.

Another object of this invention is to provide an improved pontoon mounting for use in mounting a pontoon on a caisson, the pontoon mounting being of such a nature whereby when the caisson engages the bottom of a body of water, it will move downwardly through the bottom so as to stabilize the caisson against transverse shifting prior to the engagement of the bottom with the pontoon, the pontoon being larger than the caisson and greatly increasing the bearing capacity thereof.

Still another object of this invention is to provide an improved mounting for bearing pontoons of caissons, the mounting being such that when the caissons are in supporting positions, they extend down into the bottom of the body of water in which they are mounted with the bearing pontoon resting upon the upper surface of such bottom, the pontoon having a lost motion connection with the caisson is first withdrawn from the bottom and then the pontoon is lifted out of engagement therewith.

A further object of this invention is to provide a removable pontoon mounting for mounting pontoons on caissons, the pontoon mounting including suitably spaced collars on the caisson, the collars being of a size to permit the removal of the pontoon and there being associated with each collar a locking ring of a size to prevent the removal of the caisson, the locking rings being formed

in split halves so as to facilitate their removal to permit the removal of the pontoon.

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 drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is an elevational view of a drilling rig employing a platform supported by caissons on which there are mounted the pontoon assemblies which are the subject of this invention;

Figure 2 is an enlarged fragmentary vertical sectional view taken through the lower end of one of the caissons with its associated pontoon being disposed at the lower end thereof, an intermediate portion of the caisson being broken away;

Figure 3 is an enlarged transverse sectional view taken substantially upon the plane indicated by the section line 3—3 of Figure 2 and shows the details of one of the locking rings and the relationship thereof with respect to the caisson;

Figure 4 is an enlarged fragmentary sectional view taken substantially upon the plane indicated by the section line 4—4 of Figure 3 and shows the manner in which the split halves of the locking ring are removably secured together;

Figure 5 is an enlarged fragmentary sectional view taken substantially upon the plane indicated by the section line 5—5 of Figure 4 and further shows the details of the connection between the split halves of the locking ring; and

Figure 6 is an enlarged sectional view taken substantially upon the plane indicated by the section line 6—6 of Figure 2 and shows the specific details of the construction of the pontoon.

Referring now to the drawings in detail, it will be seen that there is illustrated in Figure 1 an offshore drilling rig such as that disclosed in my copending application Serial No. 568,761, the drilling rig being referred to in general by the reference numeral **10**. The drilling rig **10** includes an elevator platform **12** which is in the form of a barge. Supported on the platform **12** is a drilling tower **14** and suitable drilling works **16**. The platform **12** is supported in elevated position above a body of water **18** by means of a plurality of caissons **20**. The caissons are locked with respect to the platform **12** by means of suitable slip assemblies **22**. The caissons **20** extend downwardly into the bottom **24** of the body of water **18** to stabilize the platform **12** against transverse shifting. Carried by lower portions of the caissons **20** are bearing pontoons **26** which are the subject of this invention.

Referring now to Figures 2 and 6 in particular, it will be seen that each of the bearing pontoons **26** is of a torus outline and includes a hollow shell which is referred to in general by the reference numeral **28**. The hollow shell **28** includes an upper annular member **30** and a lower annular member **32**. The annular members **32** are connected together by an outer cylindrical member **34** and an inner cylindrical member **36**. Reinforcing the shell **28**, which is preferably water tight, is a suitable frame which is referred to in general by the reference numeral **38**.

The frame **38** includes a plurality of inner bands **40** which are secured to the inner surface of the cylindrical member **36** in vertically spaced relation. Aligned with the bands **40** are bands **42** which are secured to the inner surface of the cylindrical member **34**. Extending radi-

ally between the bands 42 and 40 are circumferentially spaced series of vertically spaced angle members 44. The angle members 44 of each series are connected together by vertically extending, radially spaced angle members 46. The angle members 46 are in turn reinforced by diagonal braces 48.

In order to facilitate the raising and lowering of the caissons 20, the upper portion of each caisson 20 is provided with a plurality of vertically spaced collars 50, the lowermost one of the collars 50 being spaced a considerable distance above the lower end of the caisson 20, as is best illustrated in Figure 1. The caisson 20 also includes a lowermost collar 52. The collars 50 and 52 are relatively flat and are of a size to be received through a central opening 53 in the pontoon 26 defined by the cylindrical member 36. The pontoon 26 is retained on the caisson 20 by means of suitable locking rings which are referred to in general by the reference numerals 54 and 56, the locking ring 54 being disposed beneath the pontoon 26 and being engageable with the collar 52 and the locking ring 56 being disposed above the pontoon 26 and being engageable with the lowermost one of the collars 50, the collars 50 and 52 functioning as upper and lower abutments, respectively. Except for position, the locking rings 54 and 56 are identical. Accordingly, only the locking ring 54 will be described in detail hereinafter.

As is best illustrated in Figure 3, the locking ring 54 is formed in split halves 58 and 60. Each of the halves 58 and 60 is of a hollow construction reinforced at circumferentially spaced intervals by suitable plates 62. The ends of the halves 58 and 60 are closed by end plates 64.

Referring now to Figures 4 and 5 in particular, it will be seen that one of the end plates 64 has connected thereto a relatively shallow H-shaped portion 66 which includes an upper flange 68, a lower flange 70 and a vertical web 72. Secured to the other of the end plates 64 is a lower flange 74 and an upper flange 76, the flanges 74 and 76 being reinforced by suitable gussets 78 and 80, respectively. The flanges 74 and 76 are spaced apart a distance to receive the flanges 68 and 70 therebetween. Extending through the flanges 68, 70, 74 and 76 are suitable bolts 82 to lock the flanges together. By removing the bolts 82, the halves 58 and 60 may be separated.

In the use of the present invention, the platform or barge 12 is floated out into the deeper water 18. In order that the draft of the barge 12 may remain at a minimum, the caissons 20 are drawn entirely up into the barge or platform 12. At this time the pontoon 26 and the locking rings 54 and 56 are removed. Once the drilling rig 10 has reached the desired depth of water, the halves of the locking ring 56 are assembled on the caisson 20 after the caisson 20 has been projected a slight distance below the bottom of the platform 12. Next the pontoon 26 is slid over the lower end of the caisson 20. Finally, the locking ring 54 is assembled on the caisson 20 below the pontoon 26 and above the collar 52.

When all of the pontoons 26 are mounted on their respective caissons 20, the caissons 20 are permitted to be lowered until such time as they engage the bottom 24. Then pressure is exerted on the caissons 20 to drive them down into the bottom 24. The caissons 20 will normally drive down into the bottom 24 until such time as the pontoons 26 engage the bottom 24. At this time suitable bearing will be provided to prevent further downward movement of the caissons 20 and then the platform or barge 12 may be elevated to the desired height above the surface of the water 18. Due to the fact that the lower ends of the caissons 20 penetrate the bottom 24 a considerable distance, it will be readily apparent that they are prevented from transverse shifting. At the same time, the pontoons 26 take up the

necessary load and provide the necessary bearing for supporting the weight of the drilling rig 10.

When it is desired to move the drilling rig 10, the barge or platform 12 is lowered until it once again floats on the water 18. Then the caissons 20 are pulled upwardly. Inasmuch as the pontoons 26 are freely slidable on the caissons 20, the caissons 20 will be first pulled out of the bottom 24. Then after they have been pulled out of the bottom 24, the pontoons 26 may be pulled out of engagement with the bottom 24. It is pointed out at this time that if the pontoons 26 were made rigid with the caissons 20, the pull required to release the two simultaneously from the bottom 24 may be of such a nature so as to result in the submerging of the platform or barge 12. By independently pulling the two, it will be readily apparent that much less pressure is required.

After the caissons 20 and their pontoons 26 have been lifted, the barge 12 may be moved to the next location. In the event the drilling rig 10 is being moved in relatively deep water, it will not be necessary to remove the pontoons 26, the pontoons 26 being pullable up against the underside of the barge or platform 12. On the other hand, if the drilling platform 10 is to be moved to relatively shallow water, the pontoons 26 and the locking rings 54 and 56 will be removed in a reversal of their assembly procedure.

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. In combination with a caisson having a lower end thereof intended to project down into the bottom of a body of water to support a load imposed upon said caisson, a bearing pontoon, said bearing pontoon having a central opening receiving said caisson, said bearing pontoon being freely slidably mounted on the lower part of said caisson for limited vertical movement, said caisson extending down through said pontoon and having rigidly secured thereon upper and lower abutments of a size to freely pass through said pontoon, said pontoon being disposed intermediate said abutments, an upper load transferring ring carried by said caisson intermediate said upper abutment and the upper surface of said pontoon, said upper load transmitting ring having an internal diameter of a size to prevent passage upwardly beyond said upper abutment and an external diameter which is larger than the diameter of the central opening, and a lower retaining ring disposed beneath said pontoon and above said lower abutment, said lower retaining ring having an inner diameter of a size to prevent downward movement of said lower retaining ring over lower abutment and an external diameter of a size to prevent passage of said lower retaining ring through the central opening whereby said lower retaining ring serves to retain said pontoon on said caisson.

2. The combination of claim 1 wherein said rings are formed in separable halves whereby said rings and said pontoon may be removed from said caisson to facilitate retraction of said caisson into a barge and the like.

3. In combination with a caisson, a bearing pontoon, said pontoon being freely mounted on the lower part of said caisson for limited vertical movement, a collar on the lower end of said caisson below said bearing pontoon, said pontoon having a central opening receiving said caisson, said opening being of a size to permit the passage of said collar through said pontoon to facilitate the removal of said pontoon from said caisson over the lower end thereof, and a locking ring mounted on said caisson below said pontoon and above said collar, said

locking ring being engageable with both said pontoon and said collar to prevent removal of said pontoon off of the lower end of said caisson, said locking ring having an internal diameter which is less than the external diameter of said collar and an external diameter which is less than the diameter of said opening, said locking ring being formed in separable halves to facilitate removal thereof from said caisson.

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