

Clamping device for suspending a drill string or casing string from a drill floor

The invention relates to a clamping device for temporary suspending a drill or casing string from a drill floor, in which a wedge device forms a substantially circular releasable attachment in an opening in the drill floor and is provided with a series of clamping dies having an engagement surface with variable curvature for engagement with the cylindrical tubular, and a spherical seat for support of the clamping device in the drill floor.

In drilling operations, e.g. exploration and production drilling for oil and gas, clamping devices are used in many situations to engage a cylindrical body, for example a pipe, in particular to suspend a drill pipe within circumscribing structures. One example of this is slips or slips means within a rotary table on a drill floor.

Since tubulars with different pipe diameters are used, a technique is used today where clamping dies, slips and other components that engage with the external pipe surface to retain the tubular in a firm grip, need to be replaced when changes in the external pipe diameter occurs. This is time consuming and costly, and it implies that several sets of clamping devices need to be available at a location that often suffers from lack of space.

When the drilling operations take place from a floating installation, e.g. a floating drill rig or a drill ship, the installation will be moved due to waves and currents in the body of water, and these motions can by a rigid connection between the clamping device and the drill floor result in that the drill string is subjected to bending loads from the clamping device.

The object of the invention is to assist or reduce at least one of the disadvantages of the prior art technology.

The object is achieved by the features that are presented in the description to follow and in the appended claims.

The invention relates in one aspect to a slips means having one or more clamping dies arranged for engagement with a cylindrical body, in which each clamping die includes a clamping face with a curved form where each lateral portion of the clamping face forms a lip having preferably tapering thickness, wherein within each of the adjacent lateral surfaces are formed a groove provided in parallel with the clamping face and extend inwardly towards a central plane through the clamping die. The grooves are filled with a flexible material, e.g. polyurethane, which provides for that the rigidity of the lips increases. When the clamping face is forced against a cylindrical body having larger radius than the radius of curvature of the clamping face, the lips are forced outwardly such that the engagement surface between the cylindrical body and the clamping face increases. Thus adequate clamping force is achieved without the spot load on the cylindrical body gets unnecessary heavy. The flexibility of the lips is determined by their thickness, the material composition and type of material that is used in the grooves.

In a second aspect the invention relates to a spherical seat arrangement for the wedge device, where the wedge device is a slips means arranged within a rotary table associated with a drill floor.

In a third aspect the invention relates to a slips means which comprises a plurality of auxiliary wedges, each being arranged for slidable support of a clamping die, and where at least one of the auxiliary wedges is provided with an actuator which is arranged for displacement of the auxiliary wedge along an inclined plane.

The invention relates in particular to an arrangement in a clamping die for engagement with a cylindrical body, where the clamping die includes a clamping face that is arranged to be able to extend in parallel with the centre axis of the cylindrical body, wherein a groove is provided in each of two side surfaces adjacent to the clamping face and in close proximity to the clamping face, said groove extending substantially in parallel with the clamping face.

5 1.

Arrangement in a clamping die (15) for engagement with a cylindrical body (4), which clamping die (15) includes a clamping face (153) that is arranged to be able to extend in parallel with the centre axis of the cylindrical body (4), said clamping face (153) being concavely curved, **characterized in that** a groove (154) is provided in each of two lateral
10 surfaces (151) adjacent to the clamping face (153) and in close proximity to the clamping face (153), each groove (154) extending substantially in parallel with the clamping face (153), and each of said grooves (154) and said clamping face (153) form a clamping die lip (155) therebetween.

15 2.

Arrangement according to claim 1, **characterized in that** each clamping die lip (155) has a substantially gradually tapering thickness from the bottom to the opening of the groove (154).

3.

20 Arrangement according to claim 1, **characterized in that** the groove (154) is filled with a resilient material (156) different from the material of the parts of the clamping dies (15) surrounding the groove (154).

4.

25 Arrangement according to claim 1, **characterized in that** the groove (154) is filled with polyurethane.

5.

30 Arrangement according to claim 1, **characterized in that** the clamping die (15) is arranged within a slips means, a support tong, a power tong or a backup tong.

6.

Arrangement according to claim 5, **characterized in that** the slips means is arranged in a spherical seat (111) within a rotary table (2) in a drill floor (3).

7.

Arrangement according to claim 6, **characterized in that** the spherical turning surface centre of the seat (111) is arranged at or in close proximity to the rotary axis of the rotary table (2).

5

8.

Arrangement according to claim 5, **characterized in that** the slips comprises a plurality of auxiliary wedges (13) each being arranged for sliding support of a clamping die (15).

10 9.

Arrangement according to claim 8, **characterized in that** at least one of the auxiliary wedges (13) is provided with an actuator (14) which is arranged for displacement of the auxiliary wedge (13) along an inclined plane (122).

15 10.

Arrangement according to claim 8, **characterized in that** each of the auxiliary wedges (13) is connected to the adjacent auxiliary wedges (13) by means of one or two carriers (134a, 134b) for synchronous motion of the auxiliary wedges (13).