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(54) **APPARATUS FOR RETAINING RIG SLIPS IN ALIGNMENT WITH A FLOW CONTROL DEVICE**

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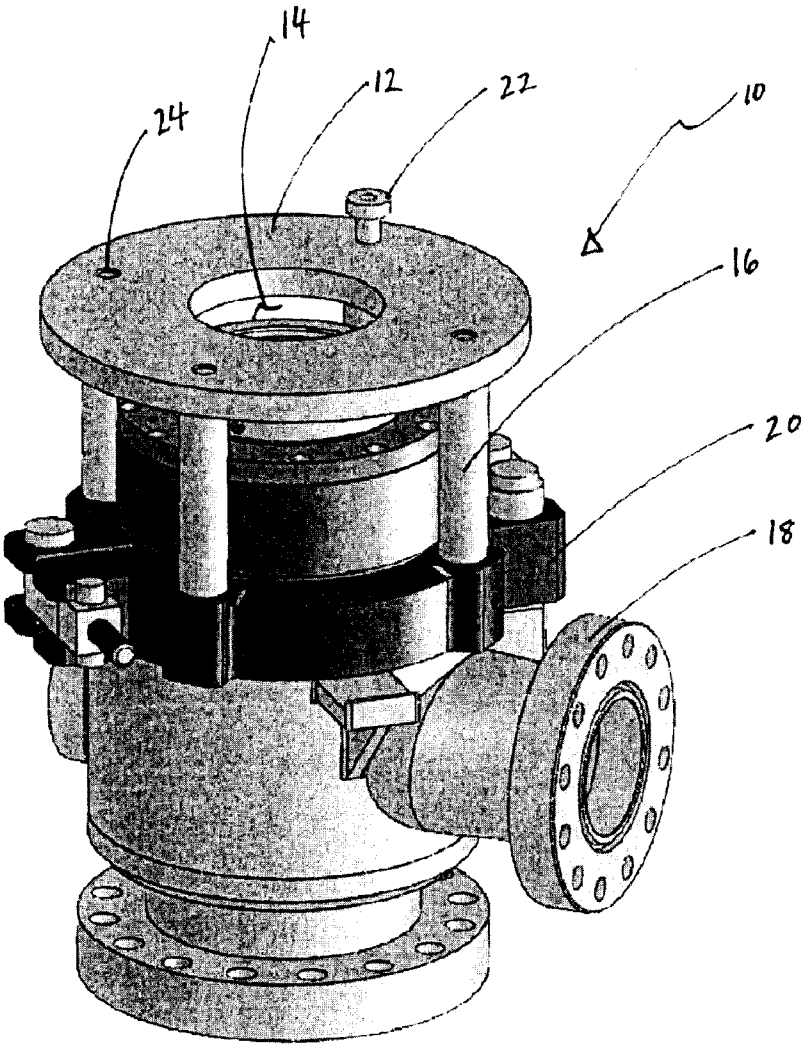
(57) **ABSTRACT**

The present invention provides an apparatus for retaining rig slips gripping a drill pipe through a bore of a flow control device. The apparatus includes a plate and a support means. The plate has an aperture that constricts the rig slips against passing trough the aperture. The support means attaches the plate to the flow control device, such that the axis of the drill pipe and the bore are substantially parallel with each other.



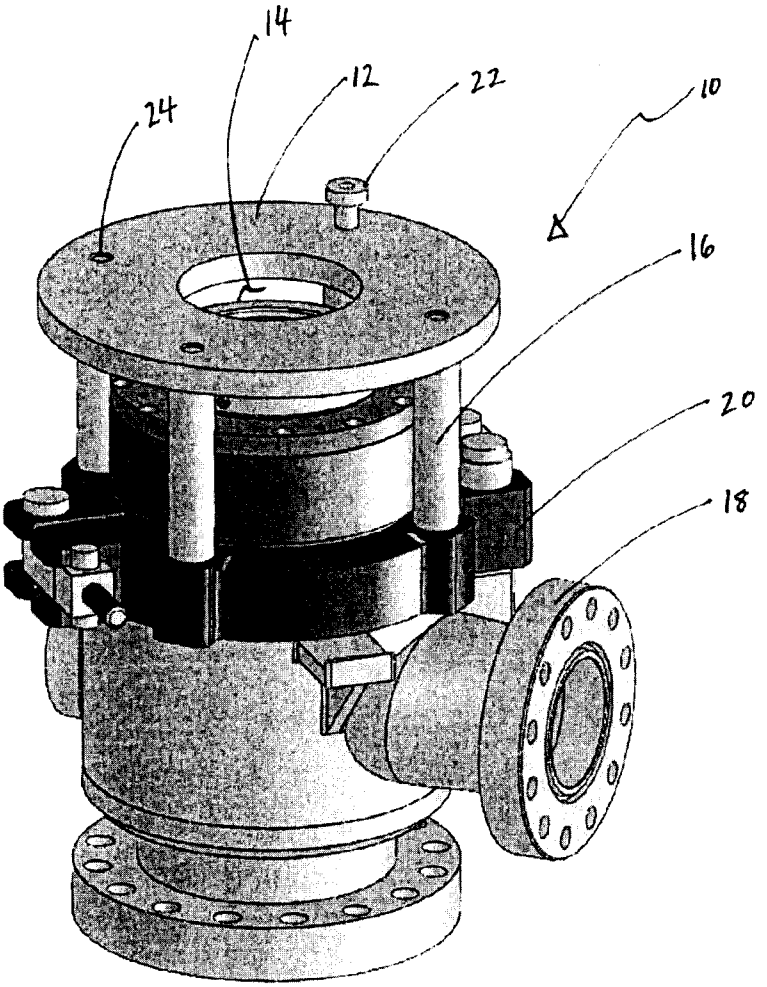


FIG. 1

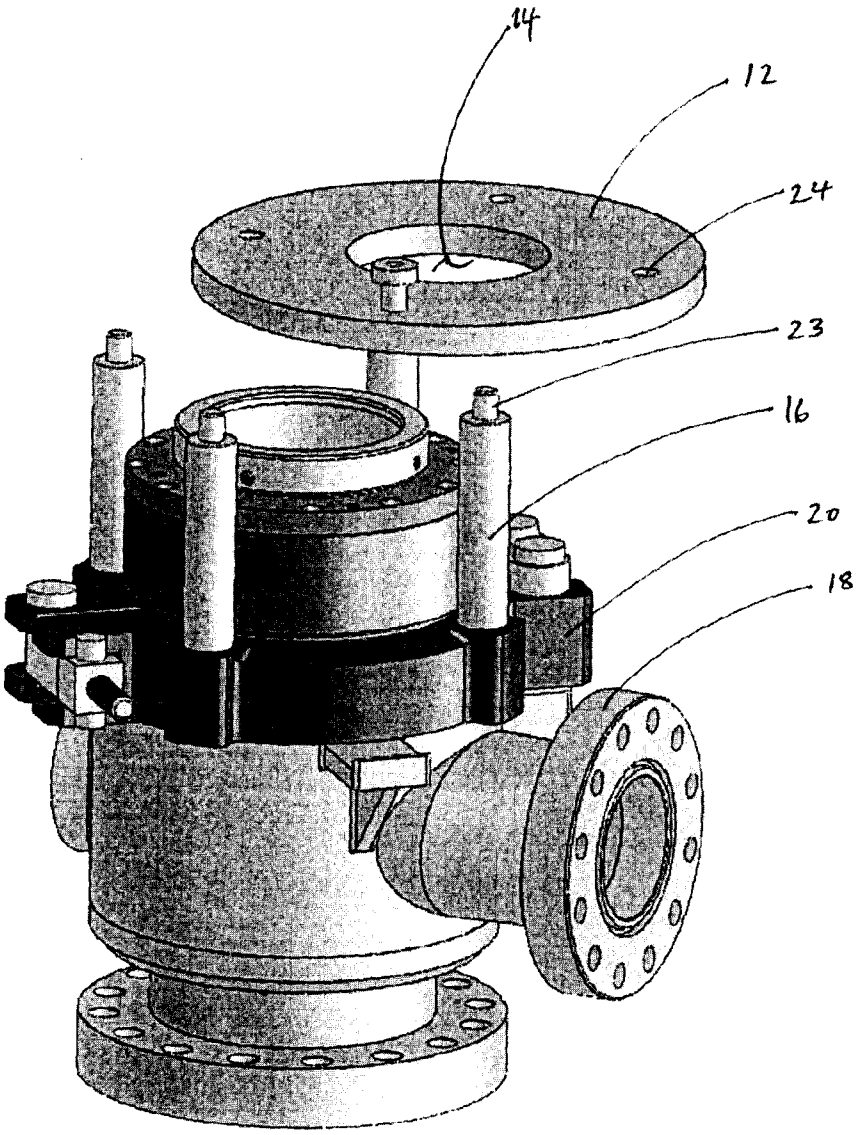


FIG. 2

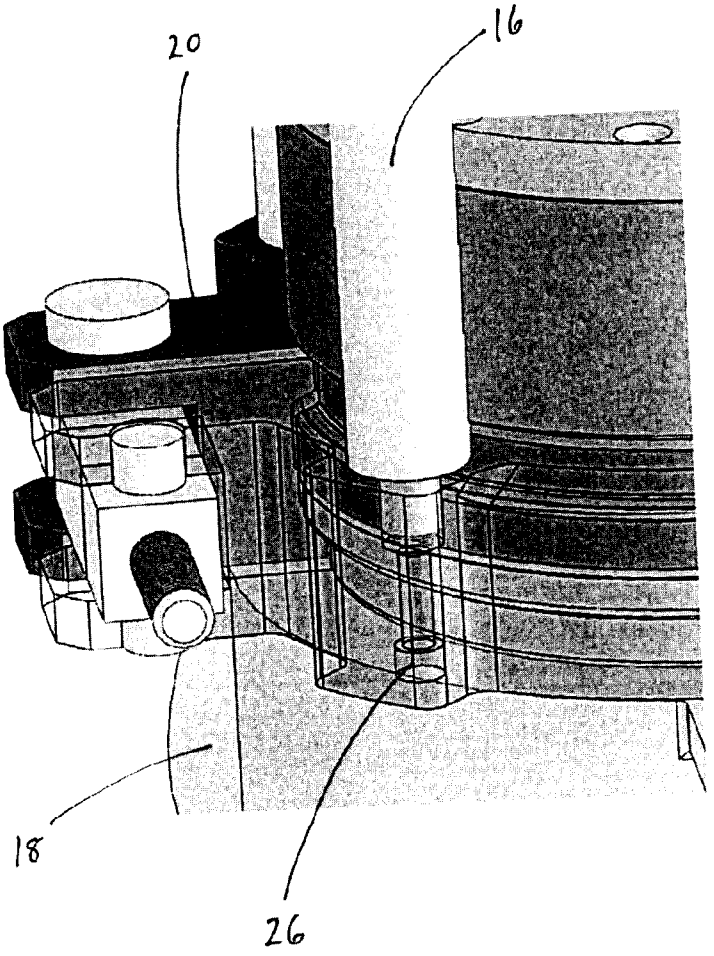


FIG. 3

APPARATUS FOR RETAINING RIG SLIPS IN ALIGNMENT WITH A FLOW CONTROL DEVICE

FIELD OF THE INVENTION

[0001] The present invention is directed to an apparatus for retaining rig slips gripping a drill pipe in alignment with a flow control device. In particular the apparatus is attachable to the flow control device, and when so attached, positions the rig slips so that the axis of the drill pipe and the axis of the bore are substantially parallel with each other.

BACKGROUND

[0002] Rig slips are devices that are used to temporarily suspend a drill pipe from a drill floor. Conventional rig slips latch around the drill pipe and seat in the rotary bushing of the rotary table. The rig slips temporarily support and transmit the weight of the drill pipe to the rotary table while the operator is making a connection or tripping pipe.

[0003] Rig slips typically consist of three or more hinged steel wedges that close in a circular configuration around the drill pipe. The inside surfaces of the steel wedges are fitted with replaceable, hardened tool-steel teeth that embed slightly into the side of the drill pipe to grip the drill pipe. The outside surfaces of the steel wedges are tapered to match the taper of the rotary table.

[0004] To suspend the drill pipe from the rotary table, one or more members of the rig crew place the rig slips around the drill pipe in a position proximate to the rotary table using handles on the rig slips. Once the rig slips are in place, the driller slightly lowers the drill pipe, which in turn pulls the wedges down into the rotary bushing because the teeth of the rig slips grip the drill pipe. This downward motion drives the wedge-shaped rig slips into the rotary bushing, which in turn results in a compressive force inward on the drill pipe. As a result the pipe becomes securably gripped by the rig slips. The rig crew then unscrews the upper portion of the drill pipe (kelly, saver sub, a joint or stand of pipe) while the lower potion is suspended from the rotary table. If the crew is tripping in, a section of drill pipe will be added, or conversely, if the crew is tripping out, a section of drill pipe will be removed and placed into the pipe rack. Once the suspended drill pipe is reconnected to the Kelly drive and the crew is ready to release the rig slip, the driller simply raises the suspended drill pipe, taking the weight of the drill pipe off the rig slips. This allows the teeth of the rig slips to release from the drill pipe. Using the handles on the rig slips, the rig crew raises the rig slips from the rotary table and open the hinged rig slips to separate them from the drill pipe.

[0005] A common problem with rig slips is misalignment of the drill pipe when it is suspended from the rotary table. If the rig slips are not aligned properly as the drill pipe is lowered, or if the rig slips move or float within the rotary bushing, the drill pipe suspended from the rotary table can move into an angled configuration, rather than hanging in a vertical plane as is desired. Among other problems, this can result in the suspended drill pipe not being centered on the blow-out-preventer (BOP) stack positioned below the rotary table. If the drill pipe is misaligned in the BOP stack, this misalignment can impair the function of either the BOP pipe ram or the blind ram, or both. This in turn jeopardizes the safety of the rig crew and creates the potential for extensive damage to the rig in the event of an uncontrolled drilling event such as a kick.

[0006] Accordingly, there is a need for an apparatus that retains rig slips in alignment with a blow out preventer stack.

SUMMARY OF THE INVENTION

[0007] The present invention is directed to an apparatus for retaining rig slips gripping a drill pipe through a bore of a flow control device. The apparatus includes a plate and a support means. The plate defines an aperture dimensioned to constrict the rig slips against passage through the aperture. The support means is attachable to the plate and to the flow control device. The plate and the support means are configured so that, when the support means is attached to the plate and the flow control device, and when the rig slips are constricted by the aperture, the apparatus positions the rig slips so that the axis of the drill pipe and the axis of the bore of the flow control device are substantially parallel with each other.

[0008] In one embodiment of the apparatus, the wall of the aperture is tapered to match the size and taper of the rig slips.

[0009] In embodiments of the apparatus, the support means may be either releasably attachable or integrally formed with the plate. In embodiments, the support means may be either releasably attachable or integrally formed with the flow control device.

[0010] In embodiments of the apparatus, the support means comprises at least one support rod extending from the plate to the flow control device. There may be a plurality of such support rods. A support may have a tapered end that is retained with a corresponding opening formed in the plate. The plate may be swivellably secured to a support rod so that the aperture of the plate can be rotated away from the bore of the flow control device, when the support means is attached to both the plate and the flow control device.

[0011] In one embodiment of the apparatus, the support means comprises a wall-like support extending between the plate and the flow control device. The wall-like support may be tubular.

[0012] In one aspect of the present invention, it comprises an apparatus for securing rig slips that are gripping a tubular, the apparatus being mounted on a flow control device having a central bore, the apparatus comprising; a plate defining an aperture, the aperture being dimensioned such that it will receive the rig slips gripping the tubular but will not permit passage of the rig slips gripping the tubular therethrough; and support means releasably attached to the flow control device and the plate, the support means releasably securing the plate in a position whereby the aperture and the central bore of the flow control device are aligned.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] In the drawings, like elements are assigned like reference numerals. The drawings are not necessarily to scale, with the emphasis instead placed upon the principles of the present invention. Additionally, each of the embodiments depicted are but one of a number of possible arrangements utilizing the fundamental concepts of the present invention. The drawings are briefly described as follows:

[0014] FIG. **1** is a perspective view of one embodiment of the apparatus of the present invention mounted on a rotating control flow diverter.

[0015] FIG. **2** is a perspective view of one embodiment of the apparatus of the present invention mounted on a rotating control flow diverter.

[0016] FIG. **3** is a perspective view of the fastening mechanism of one embodiment of the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0017] When describing the present invention, all terms not defined herein have their common art-recognized meanings. Any term or expression not expressly defined herein shall have its commonly accepted definition understood by those skilled in the art. To the extent that the following description is of a specific embodiment or a particular use of the invention, it is intended to be illustrative only, and not limiting of the claimed invention. The following description is intended to cover all alternatives, modifications and equivalents that are included in the spirit and scope of the invention, as defined in the appended claims.

[0018] The present invention relates to an apparatus for retaining rig slips gripping a drill pipe through a bore of a flow control device, such that the axis of the drill pipe and the bore of the flow control device are substantially parallel to each other. As used herein, "flow control device" shall refer to any apparatus defining a bore intended to receive a drill pipe in a drilling operation. Without limitation, flow control devices may include any rotating control head, blow out preventer or rotating flow control diverter. The flow control devices with which the present invention may be installed on top of a BOP stack in a position proximate to the drill floor. It will be understood that the drill pipe and the bore of the flow control device are both substantially cylindrical, and as used herein, "axis" in relation to a drill pipe or a bore of the flow control device, shall refer to a line segment passing through the drill pipe or bore that is substantially equidistant from the surface of the drill pipe or bore, as the case may be.

[0019] Referring to FIG. **1**, the apparatus (**10**) generally comprises a plate (**12**) defining an aperture (**14**), and a support means (**16**) attachable to the plate (**12**) and attachable to the flow control device (**18**). In FIGS. **1** to **3**, the flow control device (**18**) is shown by way of example as a rotating flow control diverter. However, the apparatus (**10**) may be used with any flow control device that is at the head of a BOP stack including a rotating control head or blow out preventer.

[0020] In one embodiment of the apparatus (**10**), as shown in FIGS. **1** and **2**, the plate (**12**) comprises a circular plate defining a concentrically positioned aperture (**14**). The shape of the plate may be any shape. The aperture (**14**) may also be of any shape, provided it is dimensioned to constrict the passage of the rig slips into gripping relationship with the drill pipe. In embodiments (not shown), the wall of the aperture (**14**) of the plate (**12**) is tapered to match the size and taper of the particular rig slips being used on the drilling rig. Different plates (**12**) having differently configured apertures (**14**) may be used to match the specific configuration of the rig slips. Accordingly, a series of interchangeable plates (**12**) may be provided to correspond to the configuration of commercially available rig slips commonly used in the drilling industry.

[0021] In one embodiment, as shown in FIGS. **1** and **2**, the support means comprises a plurality of support rods (**16**) attached to the plate (**12**) and attached to the clamp (**20**) of a flow control device (**18**). The support rods (**16**) extend from a clamp (**20**) of the rotating flow control diverter (**18**) to the plate (**12**). Although FIGS. **1** to **2** depict four support rods (**16**), any number of rods may be utilized provided that they support the plate (**12**) in a balanced fashion and are strong enough to support the weight of the rig slips and suspended drill pipe. In one embodiment (not shown), rather than individual discrete rods, the support means (**16**) comprises one or more wall-like support structures extending from the plate (**12**) to the flow control device (**18**). In a further embodiment (not shown) the wall-like support is tube-shaped.

[0022] In one embodiment, as shown in FIGS. **1** and **2**, the plate (**12**) is releasably attachable to the support rods (**16**) and can be easily removed to facilitate access to the flow control device. (**18**) The plate (**12**) may be releasably mounted on the support rods (**16**) by any suitable means commonly employed in the industry including, without limitation, bolts, clamps and pins. In the embodiment depicted in FIGS. **1** and **2**, each of the support rods (**16**) has a tapered upper end (**23**) that inserts into corresponding openings (**24**) in the plate (**12**). In the embodiment shown in FIG. **1**, the plate (**12**) is securably retained by a nut (**22**) on one of the support rods such that the plate (**12**) may be lifted and swiveled on such rod away from the flow control device (**18**), as shown in FIG. **2**. In other embodiments (not shown), the plate (**12**) may be permanently attached to the support means (**16**), by means such as welding.

[0023] In one embodiment, as shown in FIGS. **1** to **3**, the rods (**16**) are releasably attached to the clamp (**20**) of the flow control device (**18**) using suitable attachment means such as screws or bolts (**26**) as shown in FIG. **3**. Although FIGS. **1**, **2** and **3** show the rods being attached to the clamp (**20**) of the flow control device (**18**), such suggestion is not intended to be limiting and the support rods (**16**) may be attached to any suitable part of the flow control device (**18**) including, without limitation, the housing of the flow control device (**18**). In other embodiments (not shown), the support rods (**16**) are permanently affixed to the clamp (**20**) through means such as welding. In one embodiment, the flow control device (**18**) is formed with integral support rods (**16**).

[0024] In operation, the rig slips are used with the apparatus (**10**) instead of a conventional rotary table and rotary bushing. When there is a need to suspend the drill pipe, the rig slips are placed around the drill pipe in position immediately above the aperture (**14**) of the plate (**12**). The drill pipe is then lowered through the aperture (**14**), which constricts the rig slips thereby causing the rig slips to grip the drill pipe. It can be understood that the apparatus of the present invention (**10**) effectively replaces the rotary table and rotary bushing for drill pipe suspension with rig slips.

[0025] The parallel relationship between the axis of the drill pipe and the bore of the flow control device (**18**) is facilitated by the apparatus (**10**) because the plate (**12**) and support means (**16**) are configured such that, when the plate (**12**) is mounted on the rotating flow control device (**18**), that aperture (**14**) of the plate (**12**) and the bore of the rotating flow control device are concentrically aligned. Further, the proximity of the plate (**12**) to the control flow device and the relative stability of the support means (**16**) help to mitigate the movement or floating of the drill pipe during suspension.

[0026] As will be apparent to those skilled in the art, various modifications, adaptations and variations of the foregoing specific disclosure can be made without departing from the scope of the invention claimed herein.

What is claimed is:

1. An apparatus for retaining rig slips gripping a drill pipe through a bore of a flow control device, the apparatus comprising:

(a) a plate defining an aperture dimensioned to constrict the rig slips against passage through the aperture; and

(b) support means attachable to the plate and attachable to the flow control device;

wherein the plate and support means are configured for, when the support means is attached to the plate and the flow control device and when the rig slips are constricted by the aperture, positioning the rig slips so that the axis of the drill pipe and the axis of the bore of the flow control device are substantially parallel with each other.

2. The apparatus of claim **1**, wherein the wall of the aperture is tapered to match the size and taper of the rig slips.

3. The apparatus of claim **1**, wherein the support means is releasably attachable to the plate.

4. The apparatus of claim **1**, wherein the support means is integrally formed with the plate.

5. The apparatus of claim **1**, wherein the support means is releasably attachable to the flow control device.

6. The apparatus of claim **1**, wherein the support means is integrally formed with the flow control device.

7. The apparatus of claim **1**, wherein the support means comprises at least one support rod extending from the plate to the flow control device.

8. The apparatus of claim **7**, wherein the support means comprises a plurality of support rods extending from the plate to the flow control device.

9. The apparatus of claim **7**, wherein the at least one support rod has a tapered end, and the plate has a corresponding opening for retaining the tapered end therein.

10. The apparatus of claim **7**, wherein the plate is swivellably secured to the at least one support rod for, when the support means is attached to the plate and the flow control device, rotating the aperture of the plate away from the bore of the flow control device.

11. The apparatus of claim **1**, wherein the support means comprises a wall-like support extending between the plate and the flow control device.

12. The apparatus of claim **11** wherein the wall-like support is tubular.

13. An apparatus for securing rig slips that are gripping a tubular, the apparatus being mounted on a flow control device having a central bore, the apparatus comprising;

(a) a plate defining an aperture, the aperture being dimensioned such that it will receive the rig slips gripping the tubular but will not permit passage of the rig slips gripping the tubular therethrough; and

(b) support means releasably attached to the flow control device and the plate, the support means releasably securing the plate in a position whereby the aperture and the central bore of the flow control device are aligned.

14. The apparatus of claim **13**, wherein the support means is integrally formed with the flow control device.

15. The apparatus of claim **13**, wherein the support means comprises at least one support rod extending from the plate to the flow control device.

16. The apparatus of claim **15**, wherein the support means comprises a plurality of support rods extending from the plate to the flow control device

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