CLAIMS:-

1. An actuatable sealing mechanism for sealing a fluid channel provided between two co-axially arranged tubular members having a central longitudinal axis, the actuatable sealing mechanism comprising:-

an elastomeric seal provided on one of the co-axially arranged tubular members, wherein the elastomeric seal comprises a convex sealing surface;~~,~~

an axially moveable actuating sleeve member; and

a radially moveable activating member;

wherein the activating member is configured to be moveable in a radial direction in use to translate the actuatable sealing mechanism between an unsealed state and a sealed state,

whereby in the unsealed state the activating member does not move the actuating sleeve member sufficiently in a first axial direction to axially compress the elastomeric seal sufficiently to expand the elastomeric seal in a radial direction to seal the fluid channel,

and in the sealed state, the activating member moves the actuating sleeve member sufficiently in a first axial direction to axially compresse~~s~~ the elastomeric seal sufficiently to expand the elastomeric seal in the said radial direction until the convex sealing surface makes contact with the other of the co-axially arranged tubular members and ~~to~~ seals the fluid channel.

2. The~~A n~~ actuatable sealing mechanism according to claim 1, wherein the activating member is configured to be moveable in a radial inwards direction in use to translate the actuatable sealing mechanism from the unsealed state to the sealed state, and in the unsealed state the activating member does not move the actuating sleeve member sufficiently in a first axial direction to axially compress the elastomeric seal sufficiently to expand the elastomeric seal in a first radial direction to seal the fluid channel, and in the sealed state, the activating member moves the actuating sleeve member sufficiently in a first axial direction to axially compresse~~s~~ the elastomeric seal sufficiently to expand the elastomeric seal in the first radial direction to seal the fluid channel.

3. The~~A~~n actuatable sealing mechanism according to claim 2, wherein the elastomeric seal is adapted, when permitted to do so, to inherently return to its original shape of the unsealed state, and in doing so, force the actuating sleeve member to axially move back to its original position in the unsealed state, when the activating member is moved in ~~the~~ a second radial direction to return it to the unsealed state.

4. The~~A~~n actuatable sealing mechanism according to any preceding claim wherein the fluid channel is an annulus between the two tubular members and both the elastomeric seal and the actuating sleeve member are ring-shaped, and wherein the actuating sleeve member is adapted to make contact with the elastomeric ring shaped seal at all points around its circumference, such that the elastomeric seal can provide a seal around the entire annulus.

5. The~~A~~n actuatable sealing mechanism according to claim 4, wherein the elastomeric ring-shaped seal and the ring-shaped axially moveable actuating sleeve member are arranged such that they share a central axis, the central axis projecting through the centre of the elastomeric ring-shaped seal and the ring-shaped axially moveable actuating sleeve member such that each is radially disposed from the central axis on substantially the same radius from the central axis.

6. The~~A~~n actuatable sealing mechanism according to any preceding claim, wherein the first axial direction is in a direction parallel to the central axis of the elastomeric seal and the actuating sleeve member.

7. The~~A~~n actuatable sealing mechanism according to claim 6, wherein the first axial direction is movement of the actuating sleeve member in an axial direction toward the seal, and the first radial direction is perpendicular to the first axial direction, radially outward from or radially inward towards the central axis.

8. The~~A~~n actuatable sealing mechanism according to any ~~preceding claim~~either of claim 4 or claim 5, wherein the elastomeric ring-shaped seal has

one of an internal or external surface which is shaped to register with a surface of the fluid channel to be sealed, such that the elastomeric seal is configured to expand radially into the fluid channel to be sealed upon axial compression of the elastomeric seal by the axially moveable actuating sleeve member.

9. The~~An~~ actuatable sealing mechanism according to any preceding claim, wherein the radially moveable activating member is configured to be moved from the unsealed state to the sealed state by a movement mechanism comprising a locking means such that the radially moveable activating member is capable of being pushed from the unsealed state to the sealed state by the movement mechanism and is further capable of being locked in the sealed state by the locking means.

10. The~~An~~ actuatable sealing mechanism according to any preceding claim, wherein the elastomeric seal is a first elastomeric seal and the axially moveable actuating sleeve member is a first axially moveable actuating sleeve member, the actuatable sealing mechanism further comprising a second elastomeric seal and a second axially moveable actuating sleeve member.

11. The~~An~~ actuatable sealing mechanism according to any preceding claim, wherein the radially moveable activating member comprises a tapered face and the axially moveable actuating sleeve member also comprises a tapered face for engagement with the tapered face of the radially moveable activating member.

12. The~~An~~ actuatable sealing mechanism according to any preceding claim, wherein the radially moveable activating member is moveable in one radial direction when moving the actuatable sealing mechanism from the unsealed state to the sealed state and is moveable in the other radial direction when moving the actuatable sealing mechanism from the sealed state to the unsealed state.

13. The~~An~~ actuatable sealing mechanism according to any preceding claim, wherein one of the first and second tubular members comprises a first recessed

portion for housing the axially moveable actuating sleeve member and the elastomeric seal.

14. The~~An~~ actuatable sealing mechanism according to any preceding claim, wherein the said two tubular members comprise an inner tubular and an outer tubular, and it is the outer tubular that houses the radially moveable activating member, on its outer surface.

15. The~~An~~ actuatable sealing mechanism according to claim 14, wherein the outer tubular comprises both a recessed portion for housing the axially moveable actuating sleeve member and the elastomeric seal, and also houses the radially moveable activating member.

16. The~~An~~ actuatable sealing mechanism according to claim 14, wherein the elastomeric seal is located around the outer circumference of the inner tubular.

17. The~~An~~ actuatable sealing mechanism according to claim 16 when claim 14 is dependent upon claim 9, wherein the locking means further comprises a first part of a latch mechanism being provided in association with the radially moveable activating member, and a second part of a latch mechanism being provided in association with the inner tubular, wherein the first and second parts can be engaged to provide a lock therebetween to prevent axial movement occurring between the first and second tubular members, such that the actuatable sealing mechanism provides both a locking and sealing function.

18. The actuatable sealing mechanism according to any of claims 13 to 17, wherein the elastomeric seal is located wholly within the first recessed portion when in the unsealed state.

19. The actuatable sealing mechanism according to any of claims 13 to 18, wherein the outer diameter of the elastomeric seal is substantially aligned with the depth of the first recessed portion, such that it does not protrude out of the recess when in the unsealed state.

20. The actuatable sealing mechanism according to claim 19, wherein the outer diameter of the elastomeric seal is aligned with the depth of the first recessed portion, such that it does not protrude out of the recessed portion when in the unsealed state.

21. The actuatable sealing mechanism according to claim 19, wherein the outer diameter of the elastomeric seal is less than the depth of the first recessed portion, such that it does not protrude out of the recess when in the unsealed state.

2218. A method of sealing a fluid channel provided between two co-axially arranged tubular members comprising the steps of:-

providing an actuatable sealing mechanism in accordance with any of claims 1 to 2117; and

moving the radially moveable activating member radially towards a central longitudinal axis of the tubular members,

which said radial movement results in axial movement of at least one moveable actuating sleeve member,

and which said axial movement results in compression of the elastomeric seal in an axial direction,

and which said axial movement results in expansion of the elastomeric seal in a radial direction such that the actuatable sealing mechanism is translated from the unsealed state to a sealed state to seal the fluid channel.

2319. ~~An~~ The actuatable sealing mechanism according to any of claims 1 to 22 ~~elastically deformable resilient annular seal for installation into an annular groove~~, wherein in cross-section the elastomeric seal comprises:

a substantially flat tubular surface for contact with a circumferential and flat surface of the annular groove;

and wherein the~~a~~ convex sealing surface is opposite the said flat surface; and

a first convex connecting surface and a second convex connecting surface;

wherein each of the first and second connecting surfaces connect the convex sealing surface to the said flat surface.

2420. TheAn actuatable sealing mechanism ~~elastically deformable resilient annular seal~~ according to claim 2319, wherein the said substantially flat tubular surface is an inner circumferential surface of the seal.

2521. TheAn actuatable sealing mechanism ~~elastically deformable resilient annular seal~~ according to claim 2319, wherein the said substantially flat tubular surface is an outer circumferential surface of the seal.

2622. TheAn actuatable sealing mechanism ~~elastically deformable resilient annular seal~~ according to any of claims 2319 to 2521, wherein the first convex connecting surface comprises :-

a first end which connects it to a first end of the said flat surface; and

a second end which connects it to a first end of the convex sealing surface; and

the second convex connecting surface comprises:-

a first end which connects it to a second end of the said flat surface; and

a second end which connects it to a second end of the convex sealing surface.

2723. TheAn actuatable sealing mechanism ~~elastically deformable resilient annular seal~~ according to claim 2622, wherein ~~the~~ a junction between the first end of the said flat surface and the first end of the first convex connecting surface comprises a rounded corner having a radius thereon.

2824. TheAn actuatable sealing mechanism ~~elastically deformable resilient annular seal~~ according to either of claims 2622 or 2723, wherein the junction between the second end of the said flat surface and the first end of the second convex connecting surface comprises a rounded corner having a radius thereon.

2925. TheAn actuatable sealing mechanism ~~elastically deformable resilient annular seal~~ according to any of claims 2622 to 2824, wherein the first convex connecting surface comprises a curved surface which gradually arcs from its first end to its second end toward a radius plane such the second end of the first convex connecting surface lies on the radius plane in a direction parallel to the radius plane.

3026. TheAn actuatable sealing mechanism ~~elastically deformable resilient annular seal~~ according to any of claims 2622 to 2925, wherein the second convex connecting surface comprises a curved surface which gradually curves from its first end to its second end toward the radius plane such the second end of the second convex connecting surface lies on the radius plane in a direction parallel to the radius plane.

3127. TheAn actuatable sealing mechanism ~~elastically deformable resilient annular seal~~ according to any of claims 2622 to 3026, wherein the convex sealing surface comprises a semioval shape, where the first end curves from the midpoint of the convex sealing surface which is parallel to the longitudinal central axis of the seal towards its first end in a gradually reducing radius until the first end lies on the radius plane in a direction parallel to the radius plane at which point it meets the first end of the first convex connecting surface on that radius plane.

3228. TheAn actuatable sealing mechanism ~~elastically deformable resilient annular seal~~ according to any of claims 2622 to 3127, wherein the second end of the convex sealing surface curves from the midpoint of the convex sealing surface towards its second end in a gradually reducing radius until the second end lies on the radius plane in a direction parallel to the radius plane at which point it meets the second end of the second convex connecting surface on that radius plane.

3329. An integration joint assembly for use in drilling operations, the integration joint assembly comprising:-

an integration joint body comprising:-

a through bore;

an upper end adapted for connection with an upper portion of a riser system; and

a lower end adapted for connection with a lower portion of a riser system;

the integration joint assembly being adapted to permit a tubular work string to pass there through such that there is an annulus created between an inner surface of the ~~inner~~ through bore of the integration joint body and the outer surface of the tubular work string;

wherein the integration joint assembly further comprises at least one sealing device adapted in use to provide a seal within the said annulus; and

wherein the said at least one sealing device and the integration joint body are adapted such that the said at least one sealing device is capable of being located within the through bore of the integration joint body such that there is a fluid channel located between the inner surface of the through bore of the integration joint body and the outer surface of the said at least one sealing device; and

at least one actuatable sealing mechanism in accordance with any of claims 1 to 14 or claim 16 and being arranged to selectively seal said fluid channel.

3430. A method of drilling comprising the step of:-

installing an integration joint body according to claim 3329 in a riser string and running a tubular work string through the through bore thereof.

3531. A pipe sealing mechanism for sealing an annular fluid channel between an inner pipe and an outer pipe, the pipe sealing mechanism comprising:-

an actuatable sealing mechanism in accordance with any of claims 1 to 15 and being arranged to selectively seal said fluid channel.

3632. TheA pipe sealing mechanism according to claim 3531 when dependent upon claim 15, wherein the actuatable sealing mechanism is arranged such that inwards radial movement of the activating member firstly axially moves the actuating sleeve member to axially compress and thereby radially expand the elastomeric seal inwards towards the inner tubular until the elastomeric seal seals against the outer circumference of the inner tubular.

3733. A method of sealing an annular fluid channel between an inner pipe and an outer pipe, the method comprising the steps of:-

providing a pipe sealing mechanism according to either of claims 3531 or 3632; and

actuating the pipe sealing mechanism to seal the said annular fluid channel.