REMOTE AND MANUALLY ACTUATED WELL TOOL

BACKGROUND

[0001] This disclosure relates to remotely and mechanically actuated tools for use in subterranean well systems.

[0002] There are numerous tools for use in a subterranean well that can be remotely actuated by a hydraulic, electric, and/or other type of signal generated remote from the tool. Some of these tools further include provisions for mechanical actuation, for example, by a shifting tool manipulated from the surface. The mechanical actuation provides an alternative or contingency mode of actuation apart from actuation in response to the remote signal. In actuating the tool manually, however, the shifting tool must overcome the remote actuator mechanism or the remote actuator mechanism must be uncoupled from the actuated element of the tool.

SUMMARY

[0002a] According to a first aspect of the present invention, there is provided a well tool, comprising: a housing; an actuator sleeve in the housing, the actuator sleeve having an internal shifting tool engaging profile; an actuator in the housing, the actuator responsive to a remote signal to change from an unactuated state to an actuated state and shift the actuator sleeve from a first position to a second position; ~~and~~ a collet ring in the housing that comprises a plurality of collet fingers, the collet fingers supported to couple the actuator sleeve to the actuator while the actuator changes from the unactuated state to the actuated state and unsupported to allow the actuator sleeve to move relative to the actuator when the actuator is in the actuated state, the collet fingers supported in an axially elongate profile of the actuator sleeve while the actuator changes from the unactuated state to the actuated state, and an end of the axially elongate profile abuts the collet fingers and transfers loads from the actuator, through the collet fingers, to the actuator sleeve as the actuator changes from the unactuated state to the actuated state; and a tubular support body moveable between supporting the collet fingers engaged in the axially elongate profile and not supporting the collet fingers engaged in the axially elongate profile.

[0002b] According to a second aspect of the present invention, there is provided a method of actuating a well tool, comprising: supporting a collet finger of a collet ring to couple

an actuator to an actuator sleeve while moving the actuator sleeve axially relative to the actuator; operating the actuator to axially move the actuator sleeve while the collet finger is coupling the actuator to the actuator sleeve; and then, unsupporting the collet finger to allow the actuator sleeve to uncouple from the actuator after operation of the actuator.

[0002c] According to a third aspect of the present invention, there is provided a device for use in a subterranean well, the device comprising: an actuator responsive to actuate in response to a signal generated remote from the device; an actuator sleeve coupled to an actuate element of the device to operate the actuated element when the actuator shifts axially in the device; and a collet ring comprising a plurality of collet fingers that couples the actuator to the actuator sleeve to move the actuator sleeve when the actuator actuates, that allows the actuator sleeve to operate the actuated element when the actuator is coupled to the actuator sleeve without operating the actuator, and that allows the actuator to uncouple from the actuator sleeve when the actuator has been remotely actuated.

[0002d] According to another aspect of the present invention, there is provided a well tool, comprising a housing; an actuator sleeve in the housing, the actuator sleeve having an internal shifting tool engaging profile; an actuator in the housing, the actuator responsive to a remote signal to change from an unactuated state to an actuated state and shift the actuator sleeve from a first position to a second position; and a collet ring in the housing that comprises a plurality of collet fingers, the collet fingers supported to couple the actuator sleeve to the actuator while the actuator changes from the unactuated state to the actuated state and unsupported to allow the actuator sleeve to move relative to the actuator when the actuator is in the actuated state, where, with the actuator in the unactuated state, the collet fingers are ~~is~~ supported to couple the actuator sleeve to the actuator while allowing the actuator sleeve to move between the first position and the second position.

DESCRIPTION OF DRAWINGS

[0003] FIG. 1 is a side cross-sectional view of an example well system.

[0004] FIGS. 2A and 2B are detail side cross-sectional views of an example valve. FIG. 2A shows the example valve in an open position. FIG. 2B shows the example valve in a closed position.

[0005] FIGS. 3, 4A and 4B are detailed views of an example releasable coupling assembly. FIG. 3 is a half cross-sectional view with an actuator assembly of the valve unactuated and the valve closure open. FIG. 4A is a quarter sectional view showing the actuator assembly changing from an unactuated to an actuated state. FIG. 4B is a quarter sectional view showing the actuator assembly in the actuated state.

[0006] Like reference symbols in the various drawings indicate like elements.

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WHAT IS CLAIMED IS:

1. A well tool, comprising:

a housing;

an actuator sleeve in the housing, the actuator sleeve having an internal shifting tool engaging profile;

an actuator in the housing, the actuator responsive to a remote signal to change from an unactuated state to an actuated state and shift the actuator sleeve from a first position to a second position; ~~and~~

a collet ring in the housing that comprises a plurality of collet fingers, the collet fingers supported to couple the actuator sleeve to the actuator while the actuator changes from the unactuated state to the actuated state and unsupported to allow the actuator sleeve to move relative to the actuator when the actuator is in the actuated state, the collet fingers supported in an axially elongate profile of the actuator sleeve while the actuator changes from the unactuated state to the actuated state, and an end of the axially elongate profile abuts the collet fingers and transfers loads from the actuator, through the collet fingers, to the actuator sleeve as the actuator changes from the unactuated state to the actuated state; and

a tubular support body moveable between supporting the collet fingers engaged in the axially elongate profile and not supporting the collet fingers engaged in the axially elongate profile.

2. The well tool of claim 1, further comprising a valve closure and where the actuator sleeve is coupled to the valve closure and operates the valve closure between an open and closed state when the actuator sleeve is moved between the first position and the second position.

3. ~~The well tool of claim 1,~~A well tool, comprising:

a housing;

an actuator sleeve in the housing, the actuator sleeve having an internal shifting tool engaging profile;

an actuator in the housing, the actuator responsive to a remote signal to change from an unactuated state to an actuated state and shift the actuator sleeve from a first position to a second position; and

a collet ring in the housing that comprises a plurality of collet fingers, the collet fingers supported to couple the actuator sleeve to the actuator while the actuator changes from the unactuated state to the actuated state and unsupported to allow the actuator sleeve to move relative to the actuator when the actuator is in the actuated state, where, with the actuator in the unactuated state, the collet fingers are ~~is~~ supported to couple the actuator sleeve to the actuator while allowing the actuator sleeve to move between the first position and the second position.

~~4. The well tool of claim 1, where the collet is supported engaged in an axially elongate profile of the actuator sleeve while the actuator changes from the unactated state to the actuated state, and where an end of the profile abuts the collet and transfer loads from the actuator, through the collet, to the actuator sleeve as the actuator changes from the unactuated state to the actuated state.~~

~~5.~~4. The well tool of claim 41, where the axially elongate profile has a length that allows the actuator sleeve to move between the first position and the second position while the collet fingers are~~is~~ supported ~~engaged~~ in the axially elongate profile.

~~6.~~5. The well tool of claim 41, ~~where the well tool further comprises a tubular support body moveable between supporting the collet engaged in the axially elongate profile and not supporting the collet engaged in the axially elongate profile; and~~

where the well tool further comprises a shoulder in the housing positioned to abut the support body when the actuator is in the actuated position and position the support body not supporting the collet engaged in the axially elongate profile.

~~7.~~6. The well tool of claim ~~6~~5, where the support body comprises an adjuster positionable to the axial position of an end of the support body that abuts the shoulder.

~~8.~~7. The well tool of claim ~~6~~5, further comprising a coupling that couples the support body to the collet positioned supporting the collet fingers in engagement with the axially elongate profile until the support body abuts the shoulder.

~~9.~~8. The well tool of claim ~~8~~7, where the coupling comprises a shear pin.

~~10.~~9. The well tool of claim 1, where the collet ring is carried to move with the actuator.

~~11.~~10. The well tool of claim 1, where ~~the well tool comprises a plurality of collets and~~ substantially all axial loads applied by the actuator to the actuator sleeve are transferred through the ~~collets~~collet ring.

~~12.~~11. A method of actuating a well tool, comprising:

supporting a collet finger of a collet ring to couple an actuator to an actuator sleeve while moving the actuator sleeve axially relative to the actuator;

operating the actuator to axially move the actuator sleeve while the collet finger is

coupling the actuator to the actuator sleeve; and

then, unsupporting the collet finger to allow the actuator sleeve to uncouple from the actuator after operation of the actuator.

~~13.~~12. The method of claim ~~12~~11, further comprising, after unsupporting the collet finger, moving the actuator sleeve axially relative to the actuator.

~~14.~~13. The method of claim ~~12~~11, where the collet ring comprises a plurality of ~~collets~~ fingers and operating the actuator to axially move the actuator sleeve comprises transferring substantially all axial loads applied by the actuator to the actuator sleeve through the collet ring.

~~15.~~14. The method of claim ~~12~~11, where the collet ring is inwardly supported in gripping engagement with a lug threaded to an exterior of the actuator sleeve.

~~16.~~15. The method of claim ~~12~~11, where axially moving the actuator sleeve moves a valve closure of the tool between an open and closed state.

~~17.~~16. A device for use in a subterranean well, the device comprising:

an actuator responsive to actuate in response to a signal generated remote from the device;

an actuator sleeve coupled to an actuated element of the device to operate the actuated element when the actuator shifts axially in the device; and

a collet ring comprising a plurality of collet fingers that couples the actuator to the actuator sleeve to move the actuator sleeve when the actuator actuates, that allows the actuator sleeve to operate the actuated element when the actuator is coupled to the actuator sleeve without operating the actuator, and that allows the actuator to uncouple from the actuator sleeve when the actuator has been remotely actuated.

~~18.~~17. The device of claim ~~17~~16, where the device comprises a plurality of collets and substantially all axial loads applied by the actuator to the actuator sleeve are transferred through the collets.

~~19.~~18. The device of claim ~~17~~16, where the actuated element comprise a valve closure.

~~20.~~19. The device of claim ~~17~~16 where the collet fingers engage~~s~~ in an axially elongate profile in the actuator sleeve and abut~~s~~ an end of the profile when the actuator moves the actuator sleeve, and translate~~s~~ in the axially elongate profile when the actuator sleeve operates the actuated element without the actuator operating.