SUMMARY OF THE INVENTION

According to a first aspect, there is provided a liner hanger running tool to position a liner within a casing in a wellbore, comprising: a tool mandrel having a throughbore and supported on a running string; a piston mandrel surrounding the tool mandrel; the liner circumferentially surrounding at least a portion of the tool mandrel; a flow annulus between an outer surface of the tool mandrel and an inner surface of the piston mandrel defining a flow path for fluid entering the annulus from between the liner and the tool mandrel and passing upwards through the running tool to a position above the liner; and a hydraulic release mechanism activated by fluid pressure within the tool mandrel to axially move the piston positioned radially outward of the tool mandrel to release the running tool from the liner.

According to a second aspect, there is provided a liner hanger running tool to position a liner within a casing in a wellbore, comprising: a tool mandrel having a throughbore and supported on a running string; a piston mandrel surrounding the tool mandrel; a liner circumferentially surrounding at least a portion of the tool mandrel; a flow annulus between an outer surface of the tool mandrel and an inner surface of the piston mandrel defining a flow path for fluid entering the annulus from between the liner and the tool mandrel and passing upwards through the running tool to a position above the liner; a radial throughport in the tool mandrel; a radial throughport in the piston mandrel for passing fluid to a piston; a seal unit in the annulus between the tool mandrel and the piston mandrel for fluid communication from the interior of the mandrel to the piston; and a hydraulic release mechanism activated by fluid pressure within the tool mandrel to axially move a piston sealed to a piston housing and the piston mandrel to release the running tool from the liner.

According to a third aspect, there is provided a method of positioning a liner at a selected depth within a casing in a wellbore, comprising: supporting a tool mandrel on a running string; providing a piston mandrel surrounding the tool mandrel; providing a liner circumferentially surrounding at least a portion of the tool mandrel; providing a flow annulus between an outer surface of the tool mandrel and an inner surface of the piston mandrel to define a flow path for fluid entering the annulus from between the liner and the tool mandrel and passing upwards through the running tool to a position above the liner; and creating a desired level of fluid pressure within the tool mandrel to axially move a piston radially outward of the tool mandrel to release the running tool from the liner.

In one embodiment, a liner hanger running tool is provided for positioning a liner hanger within a casing in a wellbore. The tool includes a tool mandrel supported on a running string, and a housing surrounding the tool mandrel. When run in a well, the upper end of the liner circumferentially surrounds at least a portion of the running tool. The tool internal bypass extends between an outer surface of the mandrel and an inner surface of the housing. A sealed flow line is provided between a through hole in the mandrel and a through hole in the housing to provide a radial fluid flow path through the tool. A hydraulic release mechanism is activated by fluid pressure within the mandrel to axially move a piston radially outward of the housing and thereby to release the running tool from the liner.

These and further features and advantages of the present invention will become apparent from the following detailed description, wherein reference is made to the figures in the accompanying drawings.

~~AMENDED~~ CLAIMS

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1. A liner hanger running tool to position a liner within a casing in a wellbore, comprising:

a tool mandrel having a throughbore and supported on a running string;

a piston mandrel surrounding the tool mandrel;

the liner circumferentially surrounding at least a portion of the tool mandrel;

a flow annulus between an outer surface of the tool mandrel and an inner surface of the piston mandrel defining a flow path for fluid entering the annulus from between the liner and the tool mandrel and passing upwards through the running tool to a position above the liner; and

a hydraulic release mechanism activated by fluid pressure within the tool mandrel to axially move the piston mandrel positioned radially outward of the tool mandrel to release the running tool from the liner.

2. A liner hanger running tool as defined in Claim 1, further comprising:

a radial through port in the tool mandrel;

a radial through port in the piston mandrel for passing fluid to a piston; and

a seal unit in the annulus between the tool mandrel and the piston mandrel for fluid communication from the interior of the tool mandrel to the piston.

3. A liner hanger running tool as defined in Claim 1, further comprising:

a backup releasing mechanism for releasing the running tool from the set liner, the backup releasing mechanism including left hand threads interconnecting a lower portion of the running tool and an upper portion of the running tool.

4. A liner hanger running tool as defined in Claim 1, wherein the minimum cross-sectional flow area in the annulus between the tool mandrel and the piston mandrel is at least 2.5 times the minimum cross-sectional flow area between a liner running adapter and the casing.

5. A liner hanger running tool as defined in Claim 1, further comprising:

a clutch mechanism for transmitting torque through the running tool to rotate the liner, the clutch mechanism disengaging to enable release of the running tool from the liner.

6. A liner hanger running tool as defined in Claim 5, wherein the clutch mechanism is rotationally connected to the piston mandrel by one or more axially extending splines.

7. A liner hanger running tool as defined in Claim 1, wherein a piston connected to the piston mandrel seals with an inner surface of a piston housing and an outer surface of the piston mandrel.

8. A liner hanger running tool as defined in Claim 1, further comprising:

a plug seat within the tool mandrel throughbore for seating with a plug, the plug seat axially movable to release the plug from the seat.

9. A liner hanger running tool as defined in Claim 8, further comprising:

a plug diverter at a lower end of the tool mandrel for capturing the plug.

10. A liner hanger running tool to position a liner within a casing in a wellbore, comprising:

a tool mandrel having a throughbore and supported on a running string;

a piston mandrel surrounding the tool mandrel;

a liner circumferentially surrounding at least a portion of the tool mandrel;

a flow annulus between an outer surface of the tool mandrel and an inner surface of the piston mandrel defining a flow path for fluid entering the annulus from between the liner and the tool mandrel and passing upwards through the running tool to a position above the liner;

a radial throughport in the tool mandrel;

a radial throughport in the piston mandrel for passing fluid to a piston;

a seal unit in the annulus between the tool mandrel and the piston mandrel for fluid communication from the interior of the mandrel to the piston; and

a hydraulic release mechanism activated by fluid pressure within the tool mandrel to axially move a piston sealed to a piston housing and the piston mandrel to release the running tool from the liner.

11. A liner hanger running tool as defined in Claim 10, further comprising:

a backup releasing mechanism for releasing the running tool from the set liner, the backup releasing mechanism including left hand threads interconnecting the lower portion of the running tool and the upper portion of the running tool.

12. A liner hanger running tool as defined in Claim 10, wherein the minimum cross-sectional flow area in the annulus between the tool mandrel and the piston mandrel is at least 2.5 times the minimum cross-sectional flow area between a liner running adapter and the casing.

13. A liner hanger running tool as defined in Claim 10, further comprising:

a clutch mechanism for transmitting torque through the running tool to rotate the liner, the clutch mechanism disengaging to enable release of the running tool from the liner.

14. A liner hanger running tool as defined in Claim 13, wherein the clutch mechanism is rotationally connected to the piston mandrel by one or more axially extending splines.

15. A method of positioning a liner at a selected depth within a casing in a wellbore, comprising:

supporting a tool mandrel on a running string;

providing a piston mandrel surrounding the tool mandrel;

providing a liner circumferentially surrounding at least a portion of the tool mandrel;

providing a flow annulus between an outer surface of the tool mandrel and an inner surface of the piston mandrel to define a flow path for fluid entering the annulus from between the liner and the tool mandrel and passing upwards through the running tool to a position above the liner; and

creating a desired level of fluid pressure within the tool mandrel to axially move a piston radially outward of the tool mandrel to release the running tool from the liner.

16. A method as defined in Claim 15, further comprising:

providing a radial throughport in the tool mandrel;

providing a radial throughport in the piston mandrel for passing fluid to the piston; and

providing a seal unit in the annulus between the tool mandrel and the piston mandrel for fluid communication from the interior of the tool mandrel to the piston.

17. A method as defined in Claim 15, further comprising:

releasing the running tool from the liner with a backup releasing mechanism including left hand threads interconnecting a lower portion of the running tool and an upper portion of the running tool.

18. A method as defined in Claim 15, wherein the minimum cross-sectional flow area in the annulus between the tool mandrel and the piston mandrel is at least 2.5

times the minimum cross-sectional flow area between a liner running adapter and the casing.

19. A method as defined in Claim 15, further comprising:

transmitting torque through the running tool to rotate the liner.

20. A method as defined in Claim 15, wherein a piston connected to the piston mandrel seals with an inner surface of a piston housing and an outer surface of the piston mandrel.