

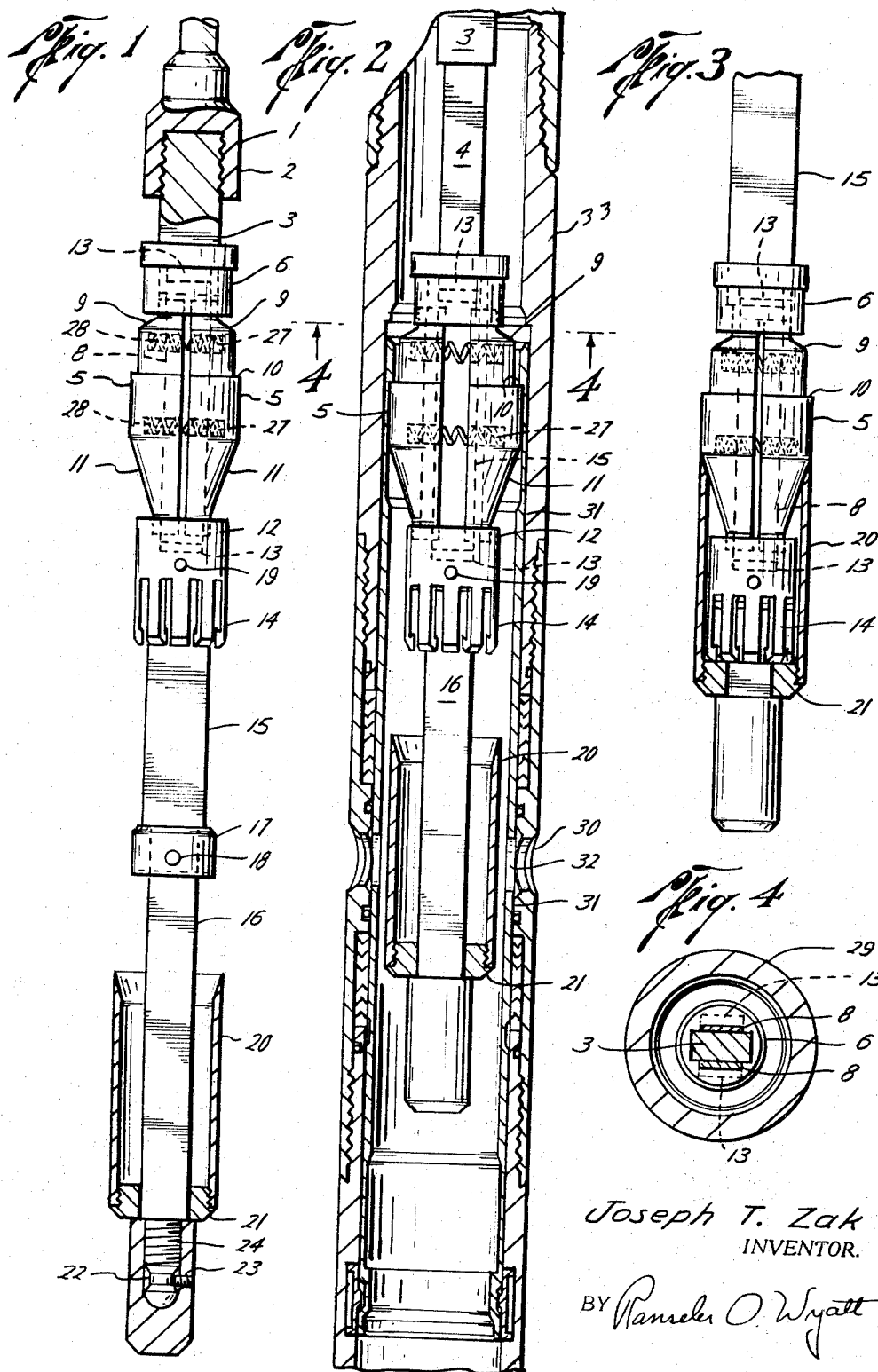
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SELECTIVE SHIFTING TOOL

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ABSTRACT OF THE DISCLOSURE

A selective shifting tool for use in a well tubing in conjunction with shifting a sleeve and establishing communication in drilling and production operations between the tubing and the tubing-casing annulus, comprising a mandrel having an upper and lower laterally reduced area, a wire line attachment at the upper end of said mandrel for connection with a wire line and lowering the tool into a shiftable sleeve to engage and shift said sleeve to move the ports thereof in alignment with the ports in the tubing, thus establishing communication with the tubing-casing annulus, or in the event of multiple completion, establishing connection with another zone where pressure of the other zone is greater than the tubing pressure, and a pair of expansible keys on said mandrel having means for constantly urging said keys outwardly, to lock the keys in the sleeve to be shifted, retainer rings on said keys and means for maintaining said retainer rings in position, means on said mandrel for releasably anchoring said keys thereon and retrieving means on the lower end of said mandrel for receiving and compressing said keys for retrieving said tool.

SUMMARY OF THE INVENTION

A selective shifting tool having a mandrel, means for attaching a wire line to said mandrel, said mandrel having upper and lower laterally reduced areas and a pair of expansible keys mounted on said mandrel, upper and lower retainer rings on said keys, means for maintaining said rings on said keys and the lower retainer ring being detachably mounted on said mandrel, an anchor ring detachably mounted on said mandrel below said retainer ring, collets on said lower retainer ring movable into engagement with said anchor ring, and a retrieving means on the bottom of said mandrel.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is an elevation of the device, showing the keys in running position.

FIGURE 2 is an elevational view of the device, showing the keys in a sleeve and in locked position.

FIGURE 3 is a partial elevational view, showing the keys in the retrieving means, preparatory to being removed from the tubing, and

FIGURE 4 is a cross sectional view taken on the line 4-4 of FIGURE 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the drawings, the numeral 1 designates a wire line connection, detachably secured to the externally threaded connector 2 formed on the upper end of the mandrel 3. Two sides of the outer surface of the mandrel 3 are reduced at 4. A pair of keys 5, 5 are mounted on the mandrel and are outwardly expansible. The upper retaining ring 6 fits over the circumferentially reduced upper end of the keys 5, 5 and a lower retainer ring 7 fits over the circumferentially reduced lower ends of the keys 5, 5, and is mounted on the mandrel 3 by the shear pin 19. A groove in the longitudinal inside face of each key receives a suspension strap 8, 8 which is overturned at each end and adapted to extend over and to fit in the grooves 13, 13

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in one end face of the respective keys 5, 5 and to be maintained in this position when the mandrel 3 is extended through the rings 6, 7.

Each key 5 is shaped to provide the beveled shoulder 9 and the straight shoulder 10, and is beveled inwardly at the lower portion as at 11 terminating in the reduced area 12 which is received within the retainer ring 7.

A shear pin 19 anchors the retainer ring 7 to the mandrel, and downwardly extended collets 14 are formed on the lower end of the retainer ring 7.

The mid portion of the mandrel 3 is enlarged as at 15, by extending diametrically opposed sides, and the lower portion of the mandrel 3 is reduced as at 16 to conform to the rectangular shape of the area 4, and an anchor ring 17 is secured to the mandrel 3 by a shear pin 18, and the lower end face of the ring 17 is undercut to receive the ends of the collets 14.

Mounted on the lower end of the mandrel 3 is the retriever which consists of a tubular member 20 which is outwardly beveled at its upper end face and internally threaded at the lower end and adapted to be mounted on the externally threaded base member 21, which has an internally threaded socket 22 which receives the reduced and externally threaded end 24 of the mandrel 3, and is anchored in position by means of a set screw 23.

Each key 5 is provided with sockets 27, 27, formed in the inside face thereof, to receive the springs 28. The device is assembled as shown in FIGURE 1 by placing the straps 8, 8 in the inside grooves of the keys 5, 5, and the upper retainer ring on the upper end of the keys, and the upper end of the mandrel inserted through the keys until the lower end of the keys passes into the upper end of the lower retainer ring 7. The wire line connector 1 is then secured to the mandrel and the tool is in running position, ready to be lowered into a string of tubing, 33. The tool may pass through any number of shiftable sleeves until the level is reached where it is desired to establish communication, and when the shoulders 10 pass the inside annular shoulders of the shiftable sleeve, as 31, in the string at the desired level, the keys 5, 5 will have expanded outwardly, and as the tool is raised, the shoulders 10 engage the upper inside shoulder of the sleeve, then the tool is jarred upwardly, severing the shear pin 19, and drawing the mandrel 3 upwardly, moving the section 15 of the mandrel between the keys, locking them in their outwardly expanded position in the sleeve, and shifting the sleeve 31, moving the ports 32 to aligned position with the ports 30, and establishing communication with the tubing-casing annulus. The collets 14 will be locked on to the anchor ring 17, the ring 17 moving upwardly with the mandrel, and the inwardly turned lower ends of the collets passing over the ring 17 and under the lower end face of said ring 17 into the undercut area thereof. In this position the pressure from the outside of the tubing, if in excess of the pressure in the tubing, will move through the ports into the tubing and sleeve, but the positive lock of the mandrel and keys in the sleeve will prevent forcing the tool upwardly in the tubing and blowing out of the well, and when the pressure in the tubing and tubing-casing annulus is equalized, the tool is again jarred upwardly, shearing the pin 18, and drawing the mandrel upwardly, moving the reduced portion 16 between the keys 5, 5 and permitting the keys to be retracted and to pass into the tubing 20 of the retriever, so that the keys will clear the shoulders of the sleeve 31, and the tool readily withdrawn from the tubing.

While the foregoing is considered a preferred form of the invention, it is by way of illustration only, the broad principle of the invention being defined by the appended claims.

What I claim is:

1. In a selective shifting tool, a mandrel, a pair of keys

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mounted on said mandrel and being laterally expansible thereon, an upper and lower retainer ring mounted on said keys, said lower retainer ring being detachably secured to said mandrel and having downwardly extending collets, an anchor ring detachably secured to said mandrel and spaced from said lower retainer ring, and a retriever mounted on the lower end of said mandrel.

2. The device defined in claim 1 wherein said keys are shaped to provide a shoulder adapted to engage the shoulder of a sleeve in a tubing to be shifted and said mandrel having means for releasably locking said keys against upward movement in said tubing.

3. The device defined in claim 1 wherein said keys are shaped to engage and shift a sleeve in a tubing into communicating position with the casing and to maintain said keys against upward movement in the tubing until pressure in the tubing and casing are equalized, said mandrel being shaped to expand or contract said keys as it is moved into different positions.

4. The device defined in claim 1 wherein said keys are

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shaped to engage and shift a sleeve in a tubing and having means for maintaining said keys against upward movement in said tubing until the pressure in the tubing and casing are equalized, said mandrel being shaped to expand and lock said keys when in one position and to release said keys and permit their retraction when in another position and means on said mandrel to retract and to maintain said keys in retracted position while the tool is withdrawn from the well.

5. The device defined in claim 1 wherein said retriever consists of a tubular member detachably mounted on said mandrel with the lowermost end thereof.

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