United States Patent [19]

Yonker

[11] **3,837,398**

[45] **Sept. 24, 1974**

[54] **KICKOVER TOOL**

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[73] Assignee: **Otis Engineering Corporation,** Dallas, Tex.

[22] Filed: **July 30, 1973**

[21] Appl. No.: **384,103**

[52] **U.S. Cl.** **166/117.5**

[51] **Int. Cl.** **E21b 7/06**

[58] **Field of Search** 166/117.5, 117.6; 417/109

[56] **References Cited**

UNITED STATES PATENTS

2,664,162	12/1953	Howard et al.	166/117.5
3,353,608	11/1967	Beebe et al.	166/117.5
3,610,336	10/1971	Sizer	166/117.5
3,732,928	5/1973	Sizer	166/117.5
3,788,397	1/1974	Terrel et al.	166/117.5

Primary Examiner—James A. Leppink

[57] **ABSTRACT**

This patent discloses a kickover tool for landing or pulling tools such as gas lift valves from side pocket mandrels in which control of movement of the tool carrier from a running to a landing or pulling position is provided by a dog mandrel which engages a single shoulder within the tubing and is movable between multiple positions to provide the necessary control.

5 Claims, 13 Drawing Figures

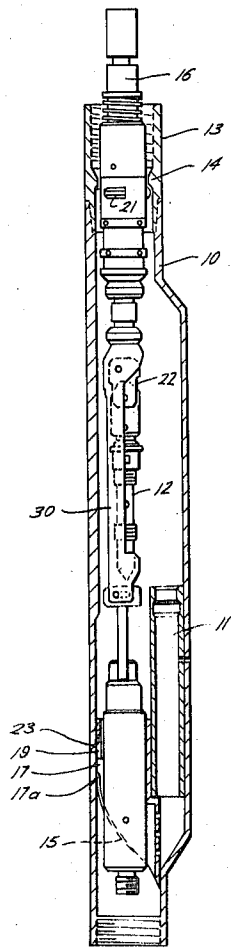

Fig. 1

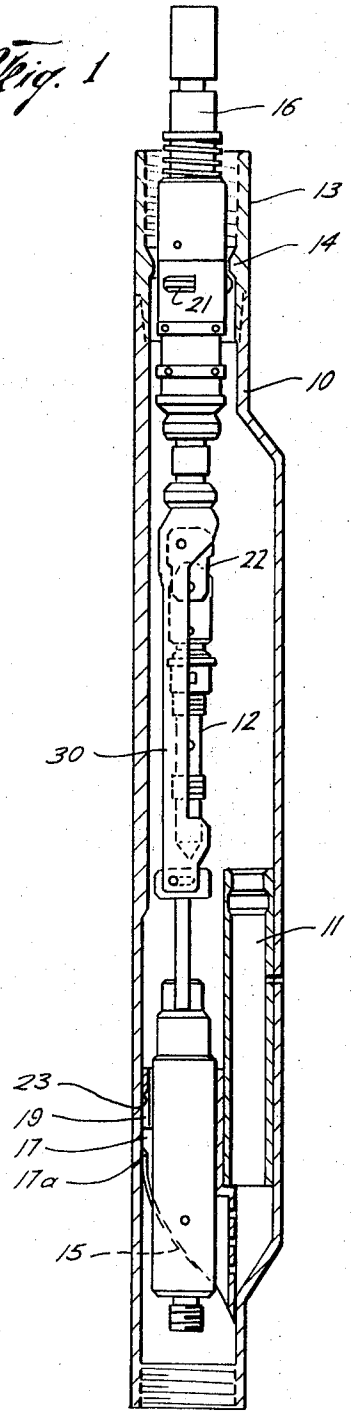

Fig. 2

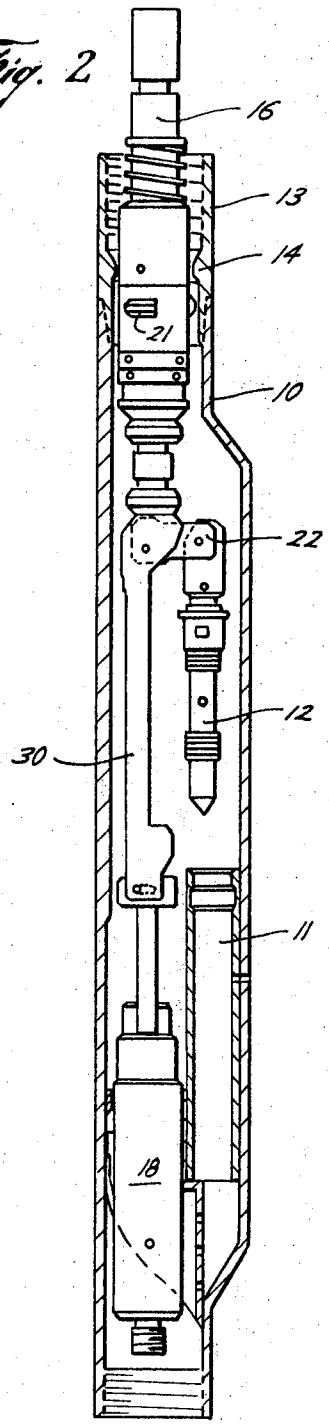

Fig. 3

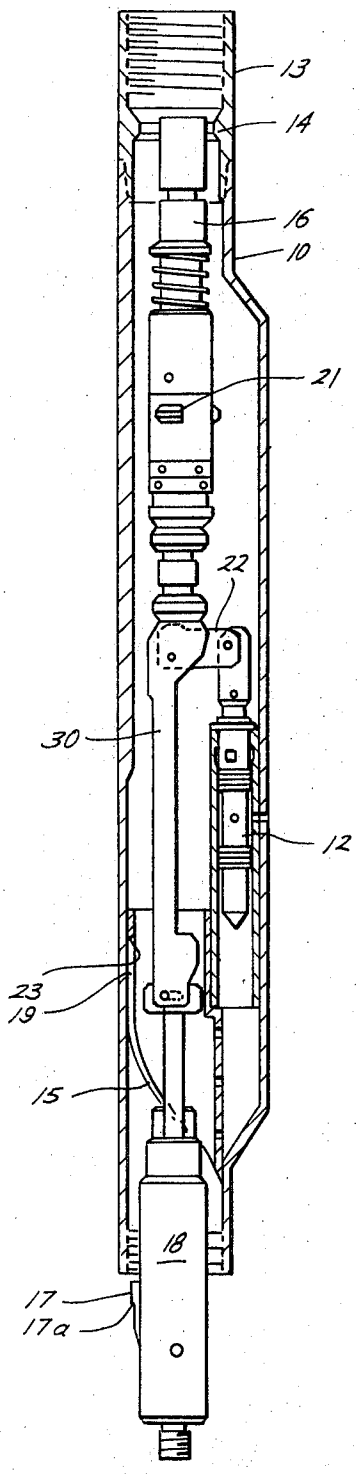

Fig. 4

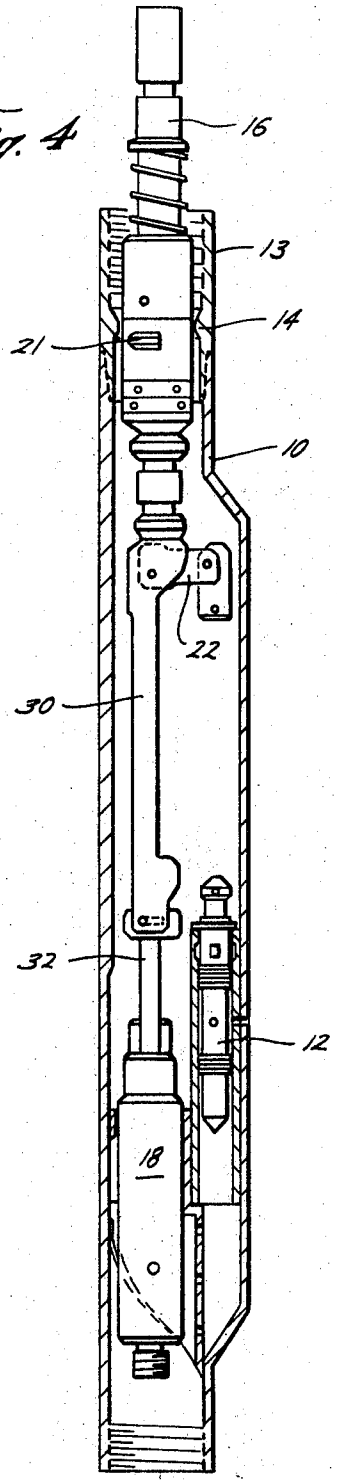

Fig. 5A

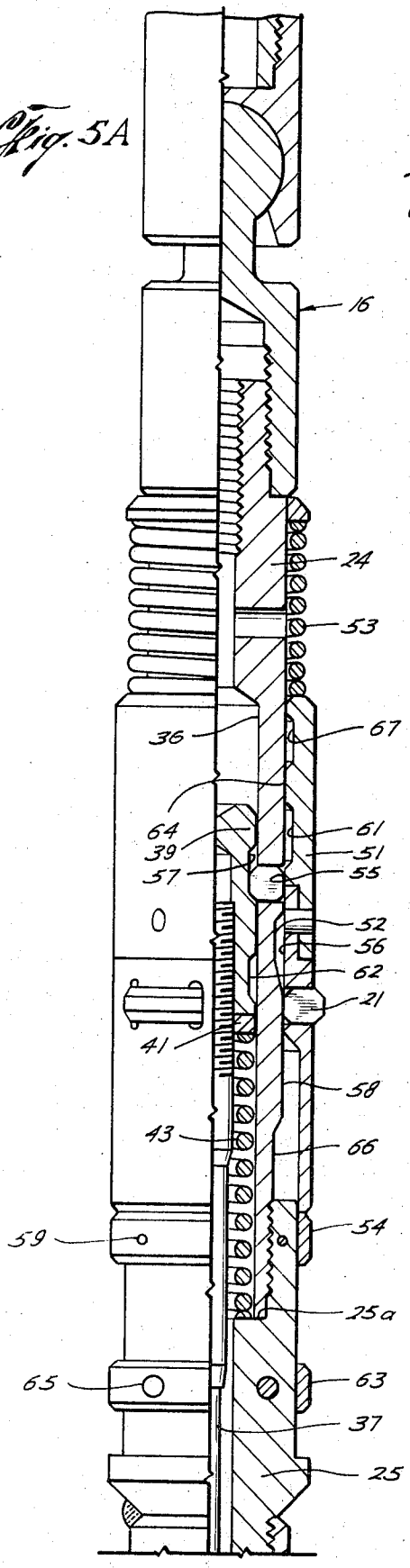
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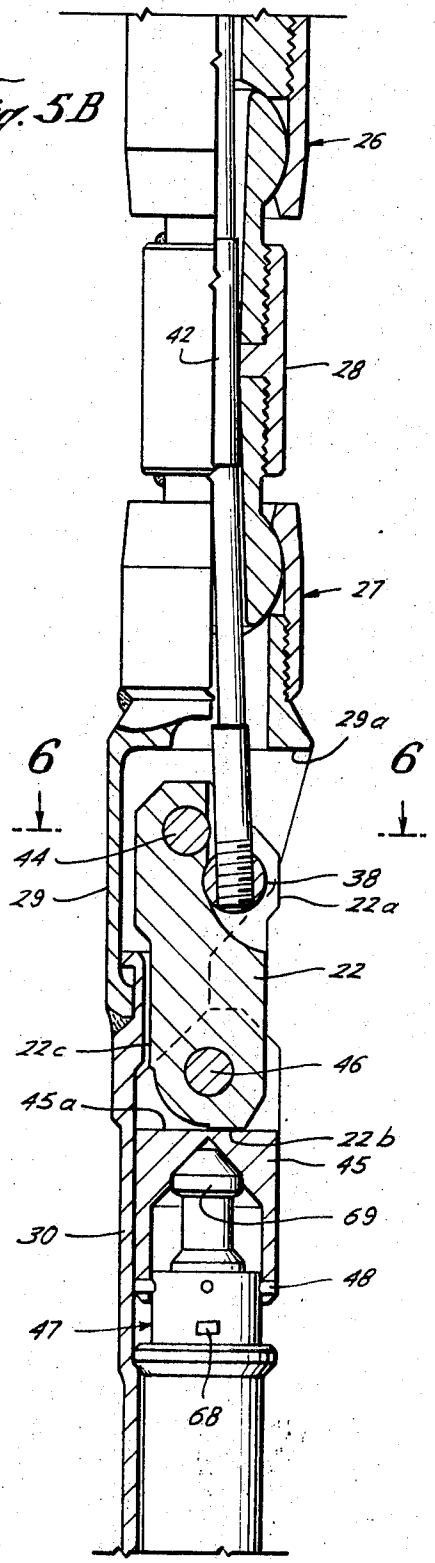
Fig. 5B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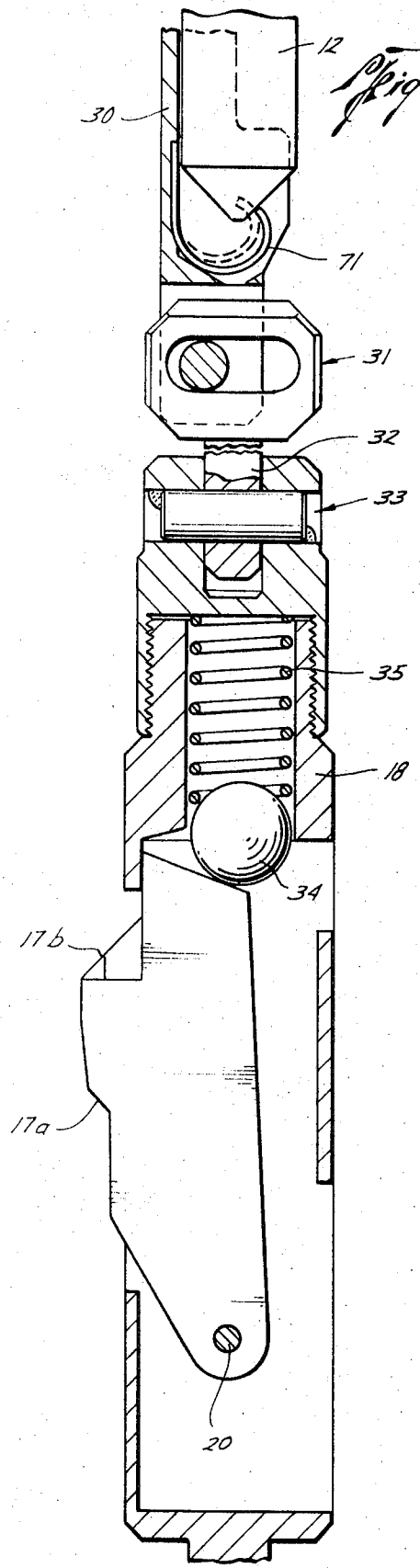

Fig. 5C

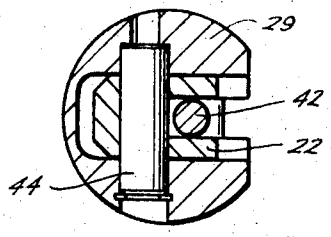

Fig. 6

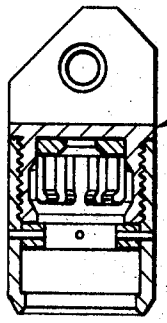

Fig. 11

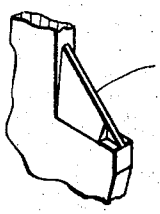

Fig. 7

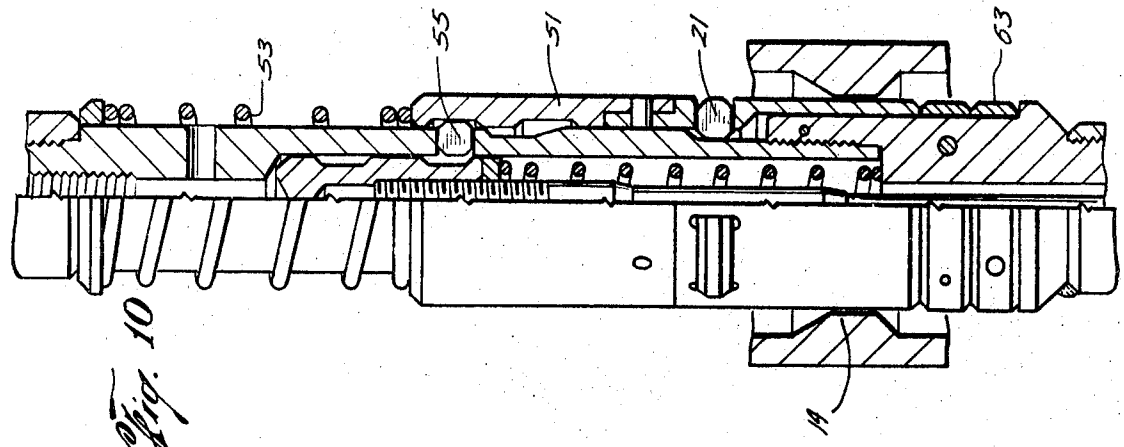

Fig. 10

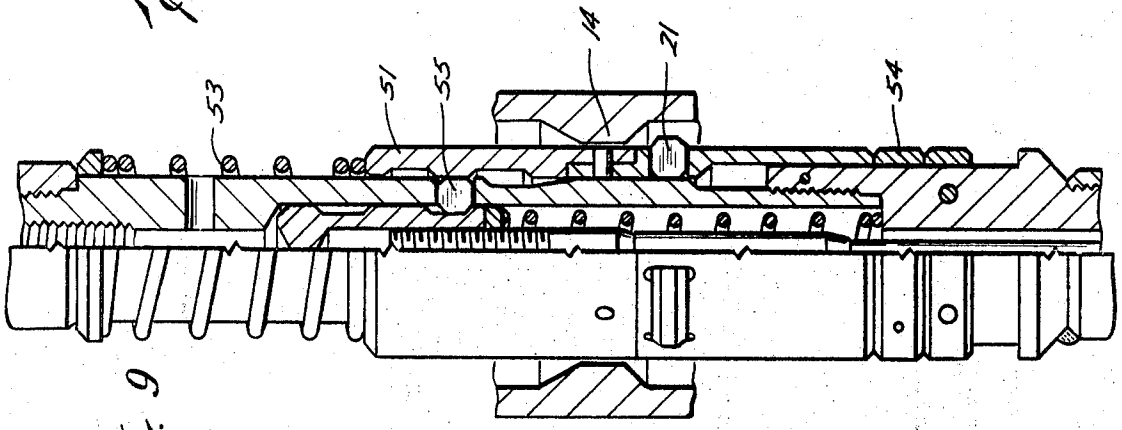

Fig. 9

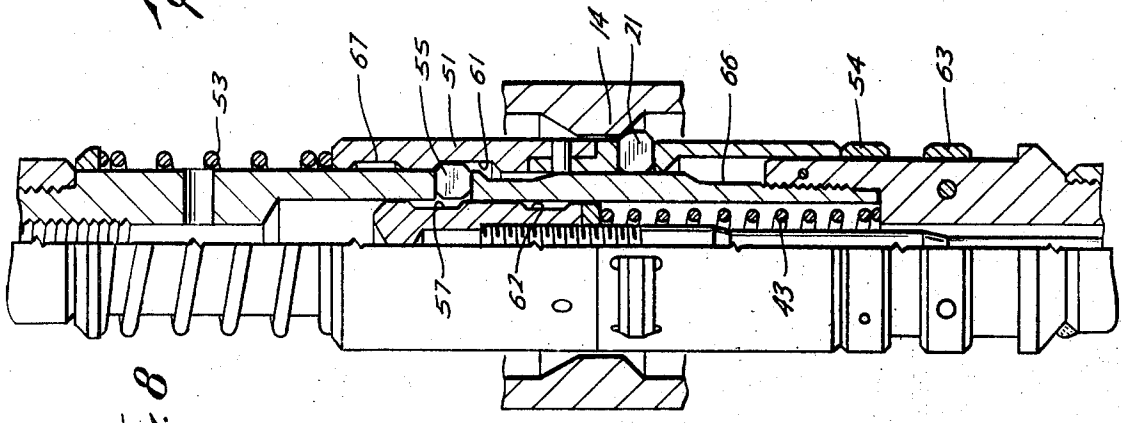

Fig. 8

KICKOVER TOOL

This invention relates to kickover tools and more particularly to kickover tools for running in or pulling tools such as gas lift valves from side pocket mandrels and further relates to a kickover tool which may be run on either a wire line or by utilizing pump-down equipment.

With the advent of the side pocket mandrel numerous forms of kickover tools have been suggested for landing and retrieving tools such as gas lift valves in the side pocket mandrels. See U.S. Pat. Nos. 2,679,903; 2,664,162; 2,679,904; 2,988,146; 3,353,608, 2,828,698; 2,942,671; 2,948,341; 3,353,607; 3,610,336; 2,959,227; 2,964,110; 3,075,586. The structures illustrated by these patents are subject to many disadvantages and limitations. Harry E. Schwegman by an invention disclosed in an application entitled "A Kickover" and dated and filed on approximately the same dates as the instant application solved many of the problems of the prior art. The Schwegman invention teaches the application of forces to a tool being run or pulled in a direction substantially parallel to the central axis of the pocket. In the application of forces in one direction by the wire line or motor in the case of pump-down equipment such forces will always remain substantially parallel to the central axis of the pocket and substantially no side components of force will be applied. The same is true in the other direction up to a selected force determined by the strength of the spring for rotating the tool carrier into the kick-over position. If forces exceed the resistance of this spring the tool carrier will tend to rotate and some side component forces will be applied. While this is still a substantial improvement over all prior art designs it is desirable that the tool be capable of withstanding the maximum forces available to run or pull a tool into or from a side pocket mandrel without the application of side forces.

It is an object of this invention to provide a kickover tool in which forces are applied to land or pull a tool in a direction substantially parallel to the central axis of a tool receiving pocket and in which the components of the kickover tool are locked in position during the landing or pulling so that maximum force may be applied to the tool being landed or pulled without supplying a substantial side component force.

Another object is to provide a kickover tool which in the kick-over position positions a tool carrier attachment for the tool being run or pulled in substantially parallel relationship with the main body of the kickover tool and in line with the pocket and the mandrel, and in which the tool carrier attachment is held in such relationship during running or pulling of the tool.

Another object is to provide a kickover tool which rotates a tool carrier approximately 90° between running and landing or retrieving position to provide for forces to be applied to the tool being run or pulled along substantially the central axis of the pocket of the mandrel and in which the tool carrier is latched against rotation during running and pulling and landing of a tool.

Another object is to improve the above-identified Schwegman kickover tool by locking the tool carrier in both running and kick-over positions.

Other objects, features and advantages of the invention will be apparent from the specification, the drawings, and the claims.

In the drawing wherein like numerals indicate like parts and wherein an illustrative embodiment of this invention is shown;

FIG. **1** is a view in vertical cross-section with the kickover tool shown in elevation with the parts in running relationship;

FIG. **2** is a view similar to FIG. **1** showing the tool carrier to have been kicked into position to land the tool within the side pocket;

FIG. **3** is a view similar to FIGS. **1** and **2** showing the tool to have been landed in the side pocket;

FIG. **4** is a view similar to FIGS. **1, 2** and **3** showing the kickover tool to have released the tool after landing it in the side pocket;

FIGS. **5***a*, **5***b* and **5***c* are continuation views partly in elevation and partly in section showing a kickover tool constructed in accordance with this invention;

FIG. **6** is a view along the line **6—6** of **5***b*;

FIG. **7** is a fragmentary view of the guide key shown in FIG. **5***c*;

FIGS. **8, 9** and **10** are quarter-section views showing different positions of the control section of the tool; and

FIG. **11** is a sectional view showing a form of pulling tools for use in connection with the invention.

The side pocket mandrel **10** is adapted to be made up in a tubing string in the conventional manner. The mandrel includes a side pocket **11** for receiving a tool such as a gas lift valve **12.** At the upper end of the mandrel a locator sub **13** is provided having a locator shoulder **14** with which the kickover tool cooperates to control the kick-over function. At the bottom of the mandrel an orienting shoe **15** is provided for orienting the entire kickover tool such that the tool to be landed is in alignment with the side pocket **11** when the kickover tool is actuated.

Reference is made to the above-identified patents, and particularly to U.S. Pat. No. 3,610,336 for an explanation of the manner in which kickover tools are run both on wire lines and with pump-down equipment. In the case of wire line operations, the wire lines attached to the upper sub **16** and in the case of pump-down equipment the locomotive or piston is attached to the sub **16.** As is conventional in practice it is preferred that the attachment be made through a set of jars so that a jarring force may be applied in utilizing the kickover tool. The forces applied are substantially larger in the case of pump-down operations than with wire line operations. Also with pump-down operations it is preferred that the tool be able to negotiate a short radius turn and as will appear hereinafter the tool is capable of articulating at several points to permit it to negotiate short radius turns. In wire line operations such turns are not encountered and the articulating joints may be dispensed with if desired.

In the general operation of the tool as shown in FIGS. **1** through **4,** the tool is run passed the FIG. **1** position to insure that the orienting key in the orienting housing **18** travels to a position below the orienting shoe **15.** Then upon upward movement of the tool, the key **17** will engage the orienting shoe **15** to rotate the tool to the proper orientation at which time the locating key **17** will be within slot **19** of the orienting shoe as shown in FIG. **1.**

Further upward movement of the kickover tool moves the dog means **21** into engagement with the locating shoulder **14.** A still further upward movement results in the tool operating in a manner to be hereinafter more fully described to kick over or move the tool carrier **22** into a position in which the tool **12** is in alignment with and substantially parallel with the tool receiving pocket **11.** Downward movement of the kickover tool then seats the tool **12** in pocket **11** as shown in FIG. **3.** The kickover tool may then be withdrawn from the hole and in the FIG. **4** position the tool is shown in the initial stage of travel coming out of the hole. It might be noted that the top of the orienting shoe is shamfered at **23** to depress the orienting key **17** and permit the key to pass through the orienting shoe. It will be noted that the locator shoulder **14** is also shamfered so that the key **17** will pass the shoulder. The lower surface **17a** of key **17** is inclined at an angle to the vertical so that the key will be depressed by both the locator shoulder and the orienting shoe in running the kickover tool into the hole.

The detail construction of the tool is shown in FIGS. **5** through **7.** The main body or stem of the tool includes sub **24** depending from the swivel coupling indicated generally at **16,** a swivel attachment secured to the lower end of sub **24,** a swivel connector indicated generally at **26,** a second swivel joint **27** connected to the joint **26** by a coupling **28,** and a pivot housing **29** carried by the joint **27.**

In order to provide for proper alignment of the kickover tool with the side pocket mandrel, it is preferred that a guide **30** extend downwardly from the stem and provide a means for generally aligning the kickover tool with the mandrel. A swivel joint **31** is provided at the bottom of guide **30.** A suitable spacing link **32** extends between the swivel **31** and a second swivel indicated generally at **33** located at the upper end of the orienting housing **18.**

In order to orient the kickover tool into the proper relationship with the pocket of the side pocket mandrel an orienting means is provided. This includes the housing **18** in which the orienting key **17** is secured as by a shear pin **20.** The shear pin **20** acts as a hinge to permit the key to be depressed as the surface **17*a*** passes over shoulders within the tubing, or as the shoulder **17*b*** at the upper end of the key passes over the chamfer **23** at the upper end of the orienting slot or the locating shoulder **14.**

In the event that the key hangs anywhere in the well, the pivot pin **20** is a shear pin which will shear and permit the key **17** to drop into the housing **18.** The key **17** is urged outwardly by the ball **34** which is spring loaded in a downwardly direction by compression spring **35.**

An actuator mandrel means is arranged in telescopic relationship with the stem means. The relative position between the actuator mandrel means and the stem means controls pivoting of the tool carrier means **22.** Preferably, the stem has a hollow bore **36** therethrough and the actuator mandrel means is telescopically or slidably received within the bore **36** of the stem means. The actuator mandrel means includes rod **37** having the ball **38** secured to its lower end. At its upper end, the actuator means includes a guide **39** which is threadedly secured to rod **37** and locked into position by locknut **41.** The rod **37** may be provided by a stiff cable having one or more stiffners **42** thereon or it may be provided by a solid rod as in the Schwegman tool identified above.

The actuator mandrel is urged in a direction away from the pivot housing **29** by a resilient means such as spring **43** which is held under compression between an internal shoulder **25*a*** and locknut **41.**

The tool carrier means is pivotally mounted on one of and is connected to the other of the stem means and the actuator means so that the tool carrier means will pivot upon relative movement of the stem means and actuator mandrel means. Preferably, the tool carrier **22** is mounted in housing **29** by pivot pin **44.**

The actuator means is secured to the tool carrier means by the lower end of rod **37** and the ball **38** thereon. As illustrated in FIG. **5*b***, the tool carrier **22** is slotted and within the slot there is a socket which receives the ball **38** to secure the actuator mandrel to the tool carrier.

In order to provide for a solid metal-to-metal connection between the stem and tool carrier **22** when seating a tool such as the valve **12** and the side pocket, the actuator mandrel is constructed to move upwardly relative to the stem a sufficient distance to bring the surface **22*a*** on the tool carrier **22** into abutment with the downwardly facing shoulder **29*a*** on the pivot housing **29.** Thus, when a downward force is applied to the kickover tool, the tool carrier **22,** after it has been moved to a kickover position, will maintain the 90° relationship shown in FIG. **2.**

A suitable cooperating shoulder is on the tool carrier **22** and the tool attachment means **45** maintain the valve **12** in alignment with the kickover tool during running and maintain it against rotation back towards the guide while the valve is being landed in the side pocket. As shown in FIG. **5*b*** the shoulder **22*b*** cooperates with a confronting shoulder **45*a*** on the tool attachment sub to hold the tool attachment sub in the position shown in FIG. **5*b***. When the tool carrier **22** is rotated to the 90° position shown in FIG. **2** the tool attachment sub means **45** rotates above pivot pin **46** until shoulder **45*a*** engages shoulder **22*c*** on the tool carrier **22.** In this position the tool **12** will be held away from the guide **30** and parallel thereto as shown in FIG. **2.** Thus, if the mandrel is inclined as is the case in a deviated well, the tool **12** being run will be held out over the side pocket if the pocket is above the kickover tool. If the pocket is below the kickover tool, the tool **12** can swing out into engagement with the wall of the mandrel. There is no force applied against the wall of the mandrel, however, other than the weight of the tool **12** and this will not be sufficient to damage the tool **12** or the mandrel. In fact, this way should not disturb anticorrosion coatings which may be present within the mandrel. Thus, no matter what the degree of deviation of the well a tool **12** is in position to be inserted into the pocket **11** without the necessity of strong forces being exerted on the tool to hold it against the wall of the mandrel above the side pocket which may result in damage to the metal of the side pocket, the coating thereon or to the tool being landed. Also in pulling of the tool **12** the shoulders **45a** and **22c** serve to hold the tool attachment means in parallelism with the direction of pull on the kickover tool.

During running of the kickover tool the latch assembly indicated generally at **47** secures the tool **12** to the tool attachment means **45** through shear pin **48.**

When the kickover tool is used to retrieve a valve from the mandrel **10**, the retrieving tool carrier means indicated generally at **49** (FIG. **11**) will be substituted for the tool carrier **45** to effect retrieving of the tool **12.**

Operation of the tool is controlled by the dog mandrel means **51.** The dog mandrel means **51** is movable between four selected positions. Position **1** is shown in FIG. **5***a*. Position **2** is shown in FIG. **9.** Position **3** is shown in FIG. **10.** Position **4** is not shown but is the position in which the dog mandrel **51** moves upwardly as viewed in FIG. **5***a* relative to the stem until the dogs **21** can drop into the reduced diameter portion **52** of nipple **24.** Thus in positions **1** and **2** the dogs **21** are held in extended position and in positions **3** and **4** the dogs **21** are permitted to retract when they engage a shoulder in the well such as the locating shoulder **14.** FIG. **5***a* shows the relationship of the dog carrier means **51** and stem while the tool is being run into the hole and the dogs **21** are not in engagement with the shoulder. When the dogs **21** engage a shoulder such as the locator shoulder **14,** the tool moves downwardly relative to the dog mandrel means **51.** This permits the dogs **21** to drop into the depression provided by the angular groove or decreased diameter portion **52** on stem nipple **24** and permits the tool to bypass the shoulder within the tubing. As soon as the tool bypasses the shoulder, the dog carrier means **51** is returned to the position shown in FIG. **5***a* by compression spring **53** which urges the dog carrier **51** downwardly to the position shown in FIG. **5***a* in which the dog carrier means **51** abuts a stop ring **54.** Thus the dog carrier means moves between its first and fourth position during running of the tool to permit the dogs **21** to retract and the kickover tool to bypass locator shoulders and the like within the hole.

During running of the tool the actuator mandrel is latched in position as shown in FIG. **5***a*, that is in a position relative to the stem at which the tool carrier **22** extends downwardly in a direction generally parallel to the guide **30.** It is latched in this position by a latch means such as a plurality of lugs, one of which is shown at **55.** These lugs ride against the annular elongate surface **56** on the interior of the dog carrier mandrel **51** and immediately above the dogs **21.** The lugs extend into an annular reduced diameter portion **57** on guide **39** to latch the stem and actuator mandrel in the position shown in FIG. **5***a* during running of the kickover tool. It will be noted that the length of the surface **56** is sufficient to permit the dog carrier to move upwardly and the dogs **21** to retract during running of the tool, thus the reciprocating motion of the dog carrier **51** during running of the tool into the well does not disturb the latch means which holds the tool carrier in general alignment with the guide **30.**

Means are provided for a yieldably resisting upward movement of the stem relative to the dog carrier from its first position as shown in FIG. 5a so that in this position the dogs **21** will be held extended by the land **58** and on stem nipple **24.** This yieldable means may be provided in any desired manner whicg will prevent the dog carrier **51** from moving below the position shown in FIG. **5***a* during running of the tool. In the form of the tool illustrated the stop collar **54** is pinned to the stem by a plurality of shear pins **59** which prevents downward movement of the dog mandrel beyond the position shown in FIG. **5***a* during running of the tool.

The tool carrier is unlatched by upward movement of the kickover tool. After the tool has been run into the hole a sufficient distance to have dogs **21** pass the desired locator shoulder **14** and the orienting key **17** to be below the orienting shoe **15,** the kickover tool is raised until the dogs **21** engage the locator shoulder **14.** At this time upward movement of the dog carrier **51** is rested by the locator shoulder **14** while the stem continues to move upward due to the force of either the wire line or piston on which it is run. The application of forces shears pins **59** and the several components of the tool are moved into the position illustrated in FIG. **8.** In this position of the dog carrier mandrel relative to the stem, the dogs **21** are still held in extended position by the land **58.** However, the internal groove **61** in dog carrier mandrel **51** is now opposite the latch lugs **55** and the lugs are free to move outwardly into the groove **61.** Thus, the latch means is released and the actuator mandrel is free to move upwardly from its FIG. **8** position to the position shown in FIG. **9** under the influence of the compression spring **43.** When the latch means is released the upward movement of the actuator mandrel rotates the tool carrier **22** to a position at which it extends approximately 90° from the running position, i.e., the position shown in FIG. **2.**

Upon the actuator mandrel reaching the position shown in FIG. **9** The tool is in a condition for the tool carrier **22** to be latched in its kickover position. This is accomplished by latching the actuator mandrel to the stem. The stem guide **39** is provided with an annular reduced diameter section or groove **62.** When the actuator mandrel is in its upper position as shown in FIG. **9,** this groove **62** is opposite the latch lugs **55,** and the lugs may be forced into this groove. To accomplish this objective and to lock the lugs in position to latch the actuator mandrel in the kickover position the upper spring **53** may now drive the dog carrier mandrel **51** and the sheared collar **54** downwardly until the collar rests upon the lower collar **63** as shown in FIG. **9.** At this time a land **64** on the internal surface of the dog carrier **51** is position opposite the lugs of **55** as shown in FIG. **9,** and the actuator mandrel is latched in its upper position, thus latching the tool carrier **22** in its extended or kickover position as shown in FIG. **2.**

The kickover tool is now lowered and a tool such as valve **12** is landed in the pocket **11** or a tool such as the valve **12** is engaged by the pulling attachment means of FIG. **11** for removal from the well. If a tool is being landed, a positive pressure may be exerted by the pumpdown assembly or the tool may be jarred down. If a wireline is being used, the tool may be jarred downwardly in the conventional manner to seat the valve **12.** When the tool is being pulled from the side pocket, the same considerations would apply and either a constant force by the wireline or pumpdown piston could be applied to the tool or a jarring force could be applied. In either event and in either direction of application of force the tool carrier **22** will be held in extended position and prevented from rotating even under extreme applications of force by the latch lugs **55** holding the actuator mandrel in place and thus preventing rotation of the tool carrier **22** about its pivot.

After landing or retrieving a tool, the kickover tool returns to a position in which the extended dogs **21** again engage the locator shoulder **14.** The tool is arrested by the locator shoulder **14** until the dog carrier

moves from its second position as shown in FIG. 9 to the third position as shown in FIG. 10.

Yieldable means are provided for resisting movement of the dog carrier means between its second and third position to prevent the dog carrier means from bypassing the second position and moving to the third position before the operator is ready to remove the kickover tool from the hole. It is sometimes difficult to determine whether or not the kickover tool has moved upwardly into engagement with the locator shoulder 14. By providing a yieldable means which holds the dog mandrel in its second position with the dogs extended, the operator may move the kickover tool up and down in the hole until he is satisfied that he has engaged the locator shoulder 14 and has applied sufficient pressure to release the latch means and move the tool carrier into kickover position. In the absence of such provision, the tool could possibly jump due to stretch in a wireline or sudden release of resistance under pump pressure to a position in which the tool being run such as the tool 12 would be up above the side pocket mandrel. In such event the tool might hang on the locator shoulder or other means in the well and prevent it from being run into the side pocket mandrel. Thus, it is preferred to provide a means which prevents movement of the dog carrier mandrel between its second and third position until after the tool has been set in the side pocket mandrel. Also, this position of the tool is used to maintain the actuator mandrel latched in its upper position as explained hereinabove as such position coincides with the latch structure for latching the actuator mandrel in the upper position and the actuator mandrel must be unlatched before the tool can be removed from the hole.

For the above reasons, it is preferred to provide a means which prevents movement of the dog carrier mandrel between its second and third positions until after the tool has been set in the side pocket mandrel. In the illustrated form, a yieldable means is provided by collar 63 which is secured to sub 25 by shear pins 65 in a position to be engaged by the lower end of the dog carrier mandrel 53 when the mandrel is in its second position. A greater force is required to move the mandrel between its second and third position than is required to move the mandrel between its first and second position. In the illustrated embodiment this greater force is provided by utilizing the shear pins 65 of larger diameter than shear pins 59. Upon the application of such force, the pins 65 shear and the collar 63 slides downwardly to the position shown in FIG. 10 at which time the dog carrier mandrel is in its third position as shown in FIG. 10 and the dogs are permitted to collapse into a groove 66 on the stem nipple 24. This permits the kickover tool to move past the locator shoulder 14 as shown in FIG. 10.

In order to release the actuator mandrel to permit the tool to be withdrawn from the hole, the dog carrier mandrel 51 is provided with an upper internal groove 67 which with the dog carrier mandrel in its full down position aligns with the lugs 55 as shown in FIG. 10. Thus, the actuator mandrel is released and is free to reciprocate within the stem as the tool is removed from the hole.

It might be noted that the spring 53 serves the purpose of continuously urging the dog carrier mandrel into engagement with the collar 54. Thus, the spring 53 serves to hold the dog carrier mandrel 51 in the several positions hereinabove explained during operation of the tool and will maintain the dog carrier mandrel in its full lower position while the tool is being pulled from the hole. As the tool is being pulled from the hole, the tool carrier 22 will engage the tubing and will be rotated downwardly to permit the kickover tool to be removed from the hole.

From the above it is believed that the operation of the tool is clear. When it is desired to run a tool in the hole, the structure shown in FIG. 5 will be used to attach a tool such as a valve to the side pocket mandrel. When it is desired to retrieve a tool from the well, the structure shown in FIG. 11 will be substituted for the tool attachment means 45. After the tool has passed the desired locator shoulder 14, the tool is raised and the orienting key 17 cooperates with the orienting shoe 15 to orient the tool as shown in FIG. 1. The kickover tool is then moved upwardly until the dogs engage the locator shoulder 14 and release the latch means as shown in FIG. 8 and permit the tool carrier 22 to kick out as shown in FIG. 2 in response to the expansion of spring 43. As soon as the locator mandrel moves to its upper position shown in FIG. 9, the latch dogs are moved inwardly by further downward movement of the dog carrier 51 to the FIG. 9 position to latch the actuator mandrel in its upper position and prevent rotation of the tool carrier 22 during landing or removing of a tool. In the event a tool is being run, the hole down structure or latch 47 will be released from the kickover tool by shearing of pins 48. After the pins shear further downward movement of the tool will expand the hole down dogs 68 and latch the tool in place in the well. In the event the retrieving tool of FIG. 11 is being utilized, it passes over and surrounds the overshot 69 to pull the overshot upwardly, thus permitting the latch dogs 68 to retract and the tool to be pulled from the side pocket mandrel.

The kickover tool is then moved upwardly until the dogs 21 again engage the locator sub 14, at which time the yieldable means provided by collar 63, and shear pins 65 is rendered ineffective to permit the stem to move upwardly relative to the dog carrier mandrel as shown in FIG. 10 to permit the dogs 21 to bypass the locator shoulder 14 and the latch lugs 55 to expand outwardly into groove 67 to release the actuator mandrel.

With the actuator mandrel latched in the down position the tool carrier 22 is held in a general position parallel with the guide. However, the tool carrier is not necessarily held firmly against the guide and this is particularly true with the articulating structure shown herein as the various joints make it possible for the tool to swing out several degrees from the carrier. To avoid the tool swinging out far enough to engage any obstruction in the well and possibly hang in the well, a keeper such as spring 71 is provided in the lower end of guide 30. The spring 71 is a coiled leaf spring with the free end engaging the tool 12 over center and holding the free end of the tool in engagement with the guide 30. The spring is shown in dashed outline in the position it occupies when the valve is not present. The spring is not needed during pulling of the tool as the free end of the tool 12 will face away from the direction of travel.

The foregoing disclosure and description of the invention are illustrative and explanatory thereof and various changes in the size, shape and materials, as well

as in the details of the illustrated construction, may be made within the scope of the appended claims without departing from the spirit of the invention.

What is claimed is:

1. A kickover tool comprising,
stem means adapted to be run in a tubing,
tool carrier means pivotally mounted on the stem means and releasably latched in a first position for running and pivotal to a second position for setting or pulling a tool,
dog mandrel means having dog means thereon and slidably mounted on the stem for movement between three positions to control operation of the kickover tool,
means maintaining the dog means extended in the first and second positions and permitting retraction of said dog means in said third position,
means releasing said latch to permit pivoting of said tool carrier means upon movement of said dog mandrel means from said first to said second positions and relatching said tool carrier means in said second position when the tool carrier means reaches said second position,
said releasing means releasing said latch upon movement of said dog mandrel means from said second to said third position,
and
means yieldably resisting movement of said dog mandrel means from said first to said second position and from said second to said third positions.

2. The kickover tool of claim 1 wherein the yieldable means is provided by a pair of spaced stop rings carried on the stem means by shear pins.

3. A kickover tool comprising,
stem means adapted to be run in a tubing,
tool carrier means pivotally mounted on the stem means and releasably latched in a first position for running and pivotal to a second position for setting or pulling of a tool,
dog mandrel means having dog means thereon and slidably mounted on the stem for movement between four positions to control operation of the kickover tool,
means maintaining said dog means extended in said first and second positions and permitting retracting of said dog means in said third and fourth positions,

means releasing said latch to permit pivoting of said tool carrier means upon movement to said dog mandrel means from said first to said second position and relatching said tool carrier means in said seecond position when the tool carrier means reaches said second position;
said releasing means releasing said latch upon movement of said dog mandrel means from said second to said third position,
means yieldably resisting movement of said dog mandrel means from said first to said second position and from said second to said third position, and
resilient means biasing said dog mandrel means toward movement from said first to said second positions and from said second to said third positions,

said dog mandrel means movable from said first to said fourth positions against said resilient means to permit retracting of said dog means.

4. A kickover tool comprising;
stem means adapted to be run in a tubing;
actuator mandrel means arranged in telescopie relationship with said stem means;
tool carrier means pivotally mounted on one of and connected to the other of said stem means and actuator means to pivot said tool carrier means upon relative movement of said stem means and actuator mandrel means;
resilient means urging said tool carrier toward kickover position;
latch means selectively latching said stem means and actuator mandrel means together in first and second selective positions in which the tool carrier means is held respectively in running position and in kick-over position;
dog mandrel means having dog means thereon and telescopically arranged with said stem means and actuator mandrel means for movement between three positions for controlling the kickover tool;
means maintaining the dog means extended in the first and second positions and permitting the dogs to retract in the third position;
means for latching the stem means and actuator mandrel means in said first position when said dog mandrel is in said first position, rendering the latch means ineffective when the dog mandrel means is moving between first and second positions, latching the stem means and actuator mandrel means in said second position when the dog mandrel means is in said second position, and rendering the latch means ineffective when the dog mandrel means is in said third position;
and means yieldably resisting movement of said dog mandrel means from said first to said second positions and from said second to said third position.

5. The kickover tool of claim 4 wherein resilient means biases the dog mandrel means from said first toward said second and third positions,
and said dog mandrel means is movable against said resilient means from said first position to a fourth position where said dog means is free to retract.

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