

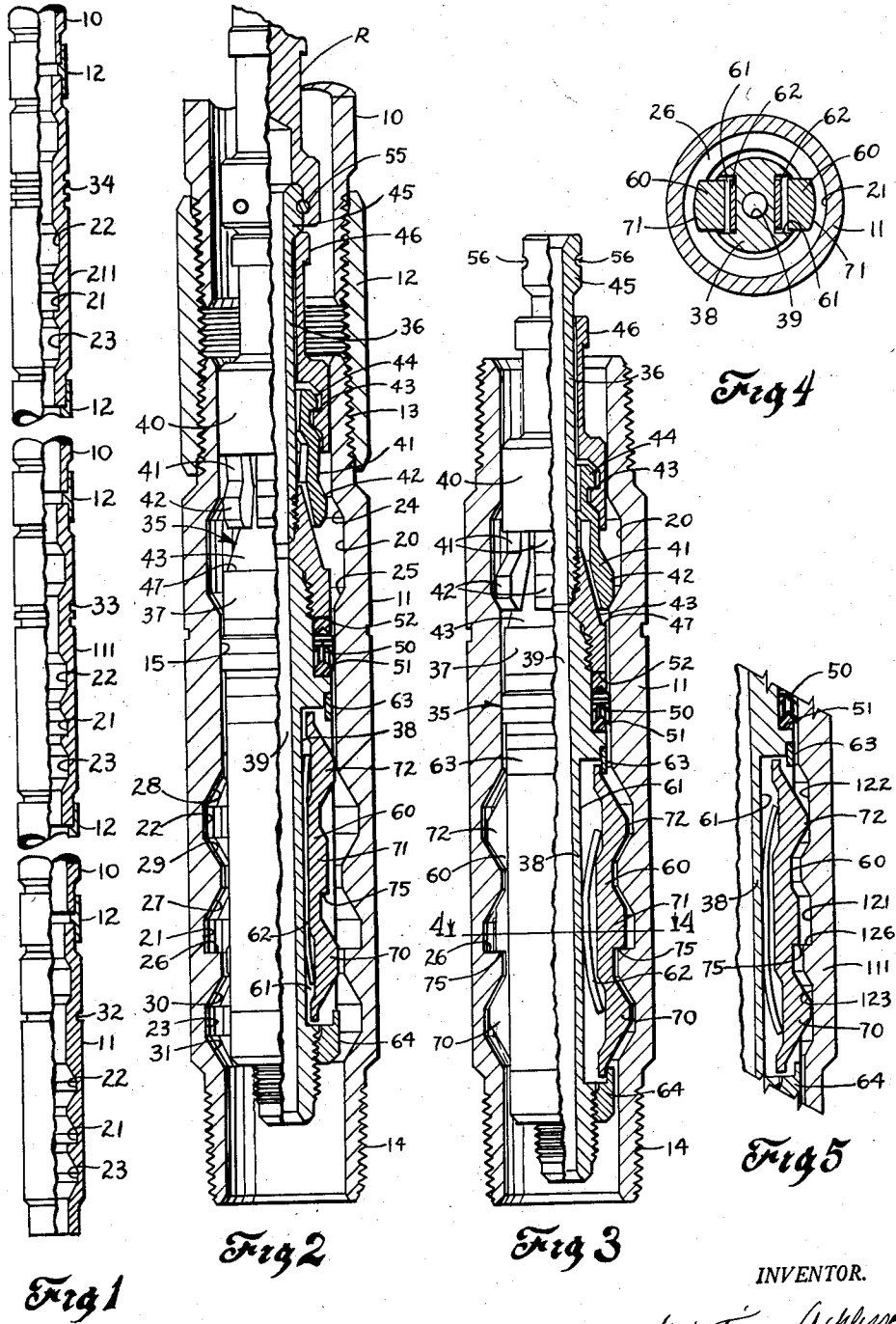
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ANCHORING DEVICES FOR WELL TOOLS

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ANCHORING DEVICES FOR WELL TOOLS

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This invention relates to improvements in anchoring devices for well tools, and refers more particularly to such anchoring devices especially adapted for securing a plurality of tools within a string of well pipe at pre-selected levels therein and in such manner that the tools may be withdrawn from the well pipe.

In the production and drilling of petroleum wells and similar wells, it is frequently desirable to position one or more well flow control devices within a string of pipe with such tool or tools anchored at selected levels in the pipe. The tools or flow controls may frequently require withdrawal from the well for repair or replacement or to permit access therpast to a lower level in the well to permit performance of other operations on the well.

It is also desirable that the means for anchoring the flow controls or other well tools in place in the well pipe provide little or no restriction or reduction in the bore of the well pipe, so that access may be readily had to the bottom of the well or to the lower end of the well pipe.

It is, therefore, one object of this invention to provide improved anchoring devices and assemblies for securing tools in and releasing tools from a well pipe.

Another object of the invention is to provide anchoring devices and assemblies for securing well tools at predetermined levels in a well pipe, which anchoring devices and assemblies are so constructed that an accumulation of sand or other debris will not prevent withdrawal of the tool from the well when desired.

It is a particular object of the invention to provide an anchoring assembly providing for positively positioning the anchoring device and the well tool carried thereby at the selected one of several possible locations within the well pipe.

Another object of the invention is to provide an anchoring assembly having separate locking dogs and selector keys, the selector keys providing means for selecting a predetermined position in a well pipe and preventing downward movement of the locking tool or anchoring tool in the pipe past such position.

A further object of the invention is to provide an anchoring assembly having selective positioning and anchoring means thereon which are interchangeable on the anchoring device, whereby the anchoring device may be anchored in any one of several selected positions by selection of the proper selective positioning and anchoring means.

A still further object of the invention is to provide an anchoring device and assembly of the character described which is readily insertable into and removable from the well pipe on a flexible line raising and lowering mechanism.

Additional objects and advantages of the invention will be readily apparent from the reading of the following description of a device constructed in accordance with the invention, and reference to the accompanying drawings thereof, wherein:

Figure 1 is a view partly in elevation and partly in

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section of a string of well pipe having a plurality of landing sections made up therein in accordance with the invention,

Figure 2 is an enlarged view, partly in elevation and partly in section of the locking and sealing portion of a landing section and showing an anchoring device being lowered into position therein,

Figure 3 is a view similar to Figure 2 showing the anchoring device in position in the landing section,

Figure 4 is a horizontal cross-sectional view taken on the line 4—4 of Figure 3, and,

Figure 5 is a fragmentary sectional view showing the selector keys of the anchoring device passing through the selector groove section of another landing section.

In the drawings, Figure 1, there is shown a string of well pipe, which may be a string of flow tubing for conducting well fluids from a producing formation of a well to the ground surface. This string of pipe is made up of a plurality of lengths of tubing 10, only small portions of which have been shown, but which constitute a major portion of the length of the string of well pipe. A plurality of landing sections, 11, 111 and 211, are made up in the string of well pipe and constitute a portion thereof, said landing sections being connected to the tubing in the usual manner by couplings 12, whereby the assembly constitutes a flow passage from the lower portion of the well to the surface of the earth.

The landing sections are shown as each having a threaded pin 13 at its upper end and a similarly threaded pin 14 at its lower end by means of which said landing section is connected in the string of well pipe. The bore 15 of the landing section is preferably of substantially the same internal diameter as the bore of the tubing 10 of the well pipe, whereby substantially unrestricted passage is provided through the well pipe and the landing section. Positioning and locking groove means is provided in the bore wall of the landing section and, in the form illustrated, includes an internal annular locking groove 20, an internal annular stop groove 21, and an upper selector groove 22 and a lower selector groove 23, said stop groove and selector grooves being considered to be a portion of the same groove assembly.

The locking groove 20 preferably is formed with divergently inwardly inclined shoulders 24 and 25 at its upper and lower ends, respectively, and is the groove in which the locking means of the anchoring device is to be secured, as will hereinafter be more fully explained. This groove functions principally as a part of the means for securing the anchoring device against upward movement within the well pipe.

The grooves 21, 22 and 23 constitute the selective positioning or stop means, and the groove 21 preferably has a stop means or shoulder therein which may be provided by an abrupt stop shoulder 26 extending substantially normally to the longitudinal axis of the landing section at the lower end of said stop groove. The upper edge of the groove 21 is provided with an upwardly and inwardly beveled shoulder 27. The selector grooves 22 and 23 are substantially identical in configuration and the upper groove has an upwardly and inwardly inclined shoulder 28 at its upper end and a downwardly and inwardly inclined shoulder 29 at its lower end, while the lower selector groove 23 has an upwardly and inwardly inclined shoulder 30 at its upper end and a downwardly and inwardly inclined shoulder 31 at its lower end. The tapered inclined shoulders of the stop groove and of the selector grooves are provided for the purpose of facilitating withdrawal of the anchoring device from the landing section, since these inclined shoulders will cam or force inwardly any dog or key which might strike the shoulders, as long as there is nothing holding the dog or key ex-

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panded or preventing its retraction. The stop shoulder 26, however, is intentionally designed to arrest downward travel of the anchoring device when the selector or stop means of the anchoring device enters the stop groove 21. Thus, the stop shoulder 26 functions to prevent downward movement of the anchoring device at any time that the selector or stop means on the anchoring device is positioned in the stop groove.

By reference to the several landing sections 11, 111 and 211, illustrated in Figure 1, it will be seen that the stop groove 21 and the selector grooves 22 and 23 in each of the various landing sections are of different diametrical dimensions, and that the diameter of the grooves in the lowermost landing section is greater than the diameter of the corresponding grooves in the upper landing sections. It will also be seen that the grooves of each of the landing sections are larger in diameter than the diameter of the corresponding grooves in the landing sections thereabove. Thus, an anchoring device equipped with selector means which will fit into the stop groove of the lowermost landing section will pass by the selector and stop grooves of each of the upper sections. Therefore, these stop grooves and selector grooves may be considered as selector key grooves.

Preferably, the exterior of the landing section each carries some indicia to indicate the size of the key grooves in order to facilitate assembling the landing sections in the string of well pipe with each landing section in its proper relative position in the pipe string. For example, the lowermost landing section has a single exterior groove 32 in its periphery. The landing section next above has a pair of external annular grooves 33 in its periphery, and the highest landing section has three external annular grooves 34 in its periphery. Obviously, these grooves indicate the proper relative position of each of the landing sections in the pipe string and, of course, the number of landing sections and the number of grooves may be correspondingly increased, or if desired a smaller number or a single landing section may be used in the well pipe.

It will be seen that the landing sections may be incorporated into the well pipe string at any desired depth; and, if desired, one or more may be incorporated as an integral portion of the well head equipment, or connected directly thereto.

The anchoring devices used in connection with the landing sections are illustrated in Figures 2 through 5, and in the form shown may be considered as comprising a three part carrier 35 made up of a neck member 36 and expander and connector member 37 and a packing and key holder member 38. The carrier may have a flow passage 39 therethrough. A carrier sleeve 40 is slidably mounted on the neck member 36 and carries at least one locking dog 41 in a manner to permit expansion and retraction of the locking boss 42 at the lower end of the dog. A plurality of dogs are shown and are the preferable construction. The lower portion of each locking dog is slidable upon the frusto-conical expander surface 43 of the expander and connector member 37 between expanded and retracted positions, and when expanded is adapted to engage in the locking groove 20 to hold the carrier 35 against upward movement out of the landing section. The carrier sleeve 40 is shown as having an enlarged lower skirt portion provided with an internal counter-bore with a shoulder 43 formed therein on which the locking dog 41 is swingably mounted by an outwardly projecting lug 44 formed at the upper end of the dog and resting on the shoulder 43. A clearance is provided between the inner side of the dog and the periphery of the neck 36, whereby the dog is free to rock inwardly and outwardly upon the outwardly extending lug 44 resting on the shoulder 43. Longitudinal upward movement of the locking dogs and the carrier sleeve 40 is limited by an enlargement or head 45 at the upper end of the neck portion 36 of the carrier, the upper end of the carrier sleeve engaging the lower end of said en-

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larged head portion. An undercut retrieving flange 46 is provided at the upper end of the reduced upper portion of the carrier sleeve whereby the device may be suitably engaged by a retrieving tool to remove the carrier from a well, as will be hereinafter more fully described.

The dogs 41 are shifted to locking position by longitudinal movement of the dogs along the frusto-conical expander surface 43, from an upper retracted position to a lower expanded position. Downward movement of the dogs on the expander surface is limited by an upwardly facing stop shoulder 47 at the lower end of the expander surface, which engages the lower end of the dogs and limits further downward movement of the dogs on the expander member. Thus, with the dogs expanded into the locking groove 20, the engagement of the upper end of the boss 42 on the dogs with the downwardly facing lock shoulder 24 in the locking groove, together with the engagement of the lower end of the dogs with the shoulder 47 on the expander member will prevent upward movement of the carrier out of the landing section.

While a plurality of dogs have been shown as incorporated in the anchoring device, it is believed obvious that one or more dogs, preferably not more than four, may be used. Also, while the relative movement between the expander member and the dogs has been shown as an upward movement of the expander with respect to the dogs, it is believed obvious that any other suitable longitudinal movement between an expander member and a locking dog which will hold the boss of the dog in expanded position in the locking groove may be utilized for the purpose of anchoring the anchoring device in the landing section.

Sealing means, shown as being in the form of a plurality of inverted V-shaped packing rings 50, is mounted on the packing and key holder member 38 below the expander and coupling member 37, the packing being confined between an upwardly facing shoulder 51 on the packing and key holder member and the lower end 52 of the expander and coupling member. The packing rings are adapted to engage and seal against the bore wall 15 of the landing section 11 to prevent upward flow of fluid exteriorly of the carrier through the landing section.

For inserting the anchoring device into the well pipe, a suitable running tool R having a socket in its lower end is engaged over the enlarged head 45 of the neck member 36, in the manner shown in Figure 2, and is detachably secured thereto by one or more shear pins 55 extending through the opposed transverse apertures in the running tool and engaging in substantially tangential grooves 56 formed on the opposite sides of the enlarged head of the neck member. The running tool may be connected to any suitable flexible line raising and lowering mechanism (not shown) in the manner well known to those skilled in the art, whereby the anchoring device may be lowered into, manipulated in, and removed from the well pipe by means of such raising and lowering mechanism.

When the tool has been lowered into the well pipe and engaged in proper landing section, the running tool R may be disconnected therefrom by upward jars or force applied to the running tool, which will shear the rivets or pins 55 and permit the running tool to be withdrawn from the well bore.

To withdraw the anchoring device from locked position in the well pipe, a retrieving or fishing tool or the like is lowered into the well pipe by the flexible line lowering mechanism and engaged with the enlarged undercut flange 46 on the upper end of the carrier sleeve 40. The retrieving tool has a part that first strikes the head 45 of the neck member to drive the same downwardly and move the expander surface 43 downwardly with respect to the locking dogs 41, whereby the dogs are free to retract inwardly when the bosses thereon engage the beveled shoulder 24 at the upper end of the locking groove 20, or any other projection or shoulder in the bore of the well pipe, as the anchoring device is moved upwardly

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through the well pipe. Such movement between the expander portion surface and the dogs also tends to dislodge any sand or other debris which might have accumulated around such parts while the device was locked in the landing section and to permit ready removal of the anchoring device from the landing section.

For stopping the anchoring device in a selected landing section in the well pipe, the selector key arrangement now to be described is included in the carrier assembly 35. The selective stopping mechanism is shown as including a pair of diametrically opposed selector keys 60 which are disposed in and adapted to move radially inwardly and outwardly of longitudinally extending grooves 61 formed in the sealing and key member 38. While two opposed key members are illustrated, it is to be understood that only a single key or more than two may be used, if desired.

The selector key members are normally biased outwardly of the slots toward engagement with the bore wall of the well pipe and with the grooves in the landing section by means of a resilient member or spring 62 mounted in each slot and bearing against the bottom of the slot and the inner side of each adjacent selector key member. The resilient members may be a leaf spring, as shown, or may be coil springs, or the like. The keys are retained against displacement from the slots at their upper end by a retaining ring or band 63 mounted in a suitable external annular groove formed in the periphery of the packing and key member 38, and at their lower ends are confined against displacement from the slots by a thimble retaining member 64 threaded onto the lower end of the selector key body member. The threaded lower end of the selector key member extends below the thimble retaining member 64, and a suitable well flow control device or other well tool may be threaded onto the lower end of said member for controlling or restricting flow through the bore 39 of the carrier member.

Each of the selector key members has a plurality of bosses formed thereon and, as shown, preferably includes a lower guide boss 70, a stop boss 71 and an upper guide boss 72. The upper and lower guide bosses are provided with outwardly convergent beveled surfaces at their upper and lower ends, whereby said bosses will cam the keys inwardly toward a retracted position upon encountering any obstruction or shoulder in the bore of the well pipe or in the landing section through which the carrier passes. The stop boss 71 has formed thereon at its lower end an abrupt stop shoulder 75 disposed substantially normal to the longitudinal axis of the carrier, and adapted to engage the upwardly facing stop shoulder 26 in the stop groove of the landing section for which the selector key is designed. Such engagement, as shown in Figure 3, provides a positive stop limiting further downward movement of the carrier 35 through the well pipe and positioning or locating the locking dogs 41 in position to be expanded into the locking groove 20 to prevent upward movement of the carrier from the landing section.

The bosses on the outer face of the selector keys form what may be called a selective stopping surface or key face, and the distance which the upper and lower guide bosses 70 and 72 project determines which of the landing sections the keys will engage in and cooperate with, since the depth of the upper and lower selective grooves 22 and 23, respectively, must conform substantially to the size of the upper and lower guide bosses 72 and 70, respectively, in order for the stop bosses 71 to enter the stop groove 21 and permit the stop shoulder 75 on such keys to engage the stop shoulder 26 in the stop groove. As is clearly shown in Figure 5, when the selector key 60 passes through one of the upper landing sections 111, the lower guide boss 70 and the upper guide boss 72 will engage the outer or bottom surface of the lower key groove 123 and of the upper key groove 122, respectively, and so limit outward movement of the downwardly facing stop shoulder 75 on the selector key, whereby said stop

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shoulder cannot engage the upwardly facing stop shoulder 126 in the lock groove 121 of the landing section 111. Thus, the anchoring device will pass downwardly through the landing section 111, and through the bore of the well pipe, until it enters the landing section 11 wherein the selector grooves 23 and 22 and the locking groove 21 are of a configuration to conform substantially to the configuration of the bosses on the selector key 60. Upon entering the landing section 11, the stop shoulder 75 on the selector key will engage the stop shoulder 26 in the stop groove and will limit further downward movement of the anchoring mechanism through the well pipe and position the locking dogs 41 in the proper position to be engaged in the locking groove 20 for preventing upward movement of the device out of the landing section.

In use, the landing sections 11, 111 and 211, etc., are made up in the pipe string at the desired levels in which it is anticipated that the anchoring devices should be located during operation of the well. This is done as the pipe string is made up and lowered into the well bore, and the landing sections actually constitute a part of the pipe string or flow conductor.

Where a plurality of well tools or flow controls are to be positioned within the well pipe string, at least an equal number of landing sections or nipples are connected in the well pipe string, the landing nipple having the deepest key slots being positioned at the lowermost location in the well pipe. Thus, the anchoring device having selector keys with guide bosses 70 and 72 projecting to the greatest diameter is first lowered within the well pipe, and when the keys 60 engage in the annular stop and guide grooves, the springs 62 bias the keys outwardly until the stop shoulder 75 on the stop boss engages the upwardly facing stop shoulder 26 in the stop groove in the landing section to arrest further downward movement of the anchoring device. In this position, shown in Figure 3, the locking dogs 41 are positioned with the bosses 42 in the locking groove 20, but not necessarily moved to fully expanded or locking position. In order to properly lock the device in place in the landing section, it is preferable to shift the carrier upwardly on its longitudinal axis until the beveled upper ends of the bosses 42 engage the downwardly facing shoulder 24 at the upper end of the lock groove and the upwardly facing stop shoulder 47 at the lower end of the expander surface of the expander member engages the lower ends of the locking dogs. In this position, the dogs are fully expanded and further undesired upward movement of the anchoring device is prevented.

The selector key or keys are always resiliently biased outwardly by the springs, and are therefore always ready to go into operation to engage the stop shoulder 26 to arrest or limit downward movement of the anchoring device. It will be understood that in normal circumstances fluid pressure from below the anchoring device acting across the sealing means 50 tends to hold the device upwardly in the locked position, but it is frequently desired to pump fluid downwardly into the well through the well pipe, and in such event the selector keys will engage the stop shoulder 26 to prevent unrestricted downward movement of the device at that time and during such downward pumping of fluids.

It will be noted that during the time that the anchoring device is in the upper position with the locking dogs engaged with the shoulder 24 at the upper end of the locking groove, the selector keys 60 are held inwardly in the retracted position substantially as shown in Figure 2, whereby sand or other detritus cannot accumulate behind the keys to prevent retraction of the same. Thus, when it is desired to remove the device from within the well tubing, it is assured that the selector keys will permit the carrier to be moved upwardly. Since the internal diameter of the landing section at the point at which it is

engaged by the upper guide boss 72 of the selector keys when in retracted position is intentionally made at least as small as any internal diameter in the bore of the well pipe above the landing section, when the locking dogs are released the keys will not interfere with the removal of the carrier from within the well pipe.

It is contemplated that the selector keys may be positioned on the carrier in such a manner as to permit the upper guide boss 72 to engage in the locking groove 20. This would permit elimination of one of the grooves in the landing section. In such case the locking dogs 41 would engage in the same groove with the upper guide boss 72, such locking dogs being spaced circumferentially of the carrier from the selector keys so as not to interfere with each other. Furthermore, it is contemplated that the carrier may be so constructed that the selector keys are not moved out of the several selector grooves or the selector groove portion of the landing section when the locking dogs are moved to fully expanded locking position. It is also contemplated that in some cases the upper guide boss 72 may be omitted from the selector keys and only the lower guide boss 70 be used, in which event the beveled surface at the upper end of the stop boss 71 would engage any obstructions above the device and initially cam the selector key inwardly, the lower guide boss subsequently engaging such obstruction and further camming the selector key inwardly as the anchoring device is moved upwardly through the well pipe. In lowering an anchoring device having such a modified selector key, the lower guide boss would adequately prevent engagement of the stop shoulder 75 on the selector from engagement with the stop shoulder 26 of landing sections for which the selector key was not designed, the diameter of the boss being adequate to prevent engagement of the stop shoulders.

From the foregoing, it will be seen that this invention is well adapted to attain all the ends and objects hereinbefore set forth, together with other advantages which are obvious and which are inherent to the structure.

The foregoing description of the invention is explanatory only, and changes in the details of the construction illustrated may be made by those skilled in the art, within the scope of the appended claims, without departing from the spirit of the invention.

What I claim and desire to secure by Letters Patent is:

1. As a sub-combination, a landing section adapted to be connected in a well string and having an internal recess formed therein, the surfaces of said section defining the upper and lower limits of said recess being divergent inwardly of said section, said section having an internal flange providing an upwardly facing abrupt stop shoulder formed in said recess intermediate said divergent surfaces and also having a second annular tapered flange formed therein above said stop shoulder.

2. In combination, a landing section means adapted to be connected in a pipe string, and anchoring tool means, one of said landing section means and anchoring tool means having a resiliently biased selector key, the other of said landing section means and said anchoring tool means having a lateral groove of lateral size and configuration corresponding to said selector key, said key and said groove having co-engageable stop parts for arresting downward movement of the anchoring tool means through said landing section means, locking means parts on each the landing section means and the anchoring tool means co-engageable to secure the anchoring tool means against upward movement out of said landing section means and retractable from engagement to permit said anchoring tool means to be removed upwardly from the landing section means, said groove having divergent beveled surfaces defining the upper and lower limits of said groove, said selector key having a pair of spaced projecting tapered bosses one above and one below said stop parts thereon, said tapered bosses providing beveled

surfaces at the upper and lower ends of said selector key engageable with the beveled surfaces defining the upper and lower limits of said groove and engageable upon upward movement of said anchoring tool means to retract the key from said groove.

3. A device for releasably anchoring a well tool at a selected level within a well pipe comprising: a carrier; locking means on said carrier expandable and retractable laterally thereof; means on said carrier movable to expand said locking means; a selector member on said carrier movable laterally of said carrier; means biasing said selector member outwardly of said carrier, said selector member having a pair of spaced tapered bosses providing outwardly convergent surfaces at its upper and lower ends and an outwardly extending abrupt stop shoulder intermediate said convergent surfaces; the lateral dimension of the bosses of said selector member above and below said stop shoulder being greater than the lateral dimension of said stop shoulder.

4. A device for releasably anchoring a well tool at a selected level in a well pipe having a plurality of spaced tubular landing sections connected therein at selected levels and each of said landing sections having an internal positioning and locking surface having a plurality of spaced annular grooves formed therein, the lower limit of one of said grooves being defined by an upwardly facing stop shoulder, one of said grooves having upper and lower limits defined by divergently inwardly extending shoulders, said positioning and locking surface of each landing section having at least one of the grooves formed therein of a different lateral dimension than the corresponding groove of the other landing sections, said device including: a carrier; locking dogs mounted on said carrier; expander means on said carrier for lateral expansion of said dogs upon longitudinal movement of said means relative to said dogs; and a selector member mounted on said carrier for limited lateral expansion and retraction; means biasing said selector member outwardly; said selector member having a key section having a downwardly facing stop shoulder engageable with the one of said grooves of a selected one of said landing sections having said upwardly facing stop shoulder to stop downward movement of the carrier at said selected landing section and to position the locking dogs in position to engage with one of said grooves in said landing nipple whereby longitudinal movement of the expander means relative to said dogs will expand the dogs to locking engagement in said groove; said selector key member having a pair of spaced outwardly tapered bosses thereon one above and one below the downwardly facing stop shoulder, each of said bosses projecting laterally a distance greater than the depth of the corresponding grooves of non-selected landing sections connected above said selected landing section in the pipe, whereby the downwardly facing stop shoulder of said selector key section will not enter the stop shoulder grooves of such non-selected landing sections.

5. In combination, a well pipe having a plurality of spaced landing sections connected therein at selected levels and each having an internal positioning and locking surface having a plurality of spaced annular grooves formed therein, the lower limit of one of said grooves being defined by an upwardly facing stop shoulder, one of said grooves having upper and lower limits defined by divergently inwardly extending shoulders, said positioning and locking surface of each landing section having at least one of the grooves formed therein of a different lateral depth than the corresponding groove of the other landing sections, and a device for releasably anchoring a well tool in a selected one of said landing sections including: a carrier; selective locking means mounted on said carrier for limited lateral expansion and retraction and having a downwardly facing stop shoulder, an upwardly facing lock shoulder and a surface below said lock shoulder inclined downwardly and outwardly of the longitudi-

nal axis of the carrier and providing a selector key portion on said selective locking means; means for moving said selective locking means to locking position; said selector key portion having a lateral dimension engageable with the one of the grooves of a selected one of said landing sections having the divergent inwardly extending shoulders and the different lateral depth; the lateral dimension of said selector key portion being greater than the depth of the corresponding grooves of non-selected landing sections connected above said selected landing section in the well pipe, whereby said selector key portion will not permit the stop shoulder on the selective locking means to engage the upwardly facing stop shoulders in the non-selected landing sections thereabove.

6. A device for releasably anchoring a well tool at a selected level in a well pipe having a plurality of spaced tubular landing sections connected therein at selected levels and each of said landing sections having an internal positioning and locking surface having a plurality of spaced annular grooves formed therein, the lower limit of one of said grooves being defined by an upwardly facing stop shoulder, one of said grooves having upper and lower limits defined by divergently inwardly extending shoulders and having a lateral depth differing from the depth of the corresponding groove of the other landing sections; said device including: a carrier; selective locking means on said carrier movable laterally of said carrier; means for moving said selective locking means to expanded position; said selective locking means having a downwardly facing stop shoulder formed thereon adapted to engage the upwardly facing stop shoulder of a selected one of said landing sections, and also having a selector key portion disposed below the stop shoulder and having outwardly convergent surfaces, said selector key portion being adapted to engage in the one of the grooves having a lateral dimension greater than the depth of the corresponding grooves of non-selected landing sections connected thereabove in the well pipe whereby said selector key section will not enter the grooves of said non-selected landing sections, thus preventing the stop shoulder of the selected locking means from engaging the upwardly facing stop shoulders in the grooves of the internal positioning and locking surfaces of the non-selected landing sections.

7. A device for releasably anchoring a well tool at a selected level in a well pipe having a plurality of spaced tubular landing sections connected therein at selected levels and each having an internal positioning and locking surface having a plurality of spaced annular grooves formed therein, the lower limit of one of said grooves being defined by an upwardly facing stop shoulder, one of said grooves having upper and lower limits defined by divergently inwardly extending shoulders, said positioning and locking surface of each landing section having at least one of the grooves therein other than the groove containing the stop shoulder formed with a different lateral depth than the corresponding groove of the other landing sections, said device including: a carrier; locking dogs mounted on the carrier; expander means on the carrier for movement of the dogs to locking position upon longitudinal movement of the expander means rela-

tive to the dogs; and a selective stop member mounted on the carrier for limited lateral expansion and retraction; means biasing said stop member outwardly; said selective stop member having a downwardly facing stop shoulder formed thereon engageable in the one of said grooves of a selected one of said landing sections having the upwardly facing stop shoulder therein to stop downward movement of the carrier at said selected landing section and to position the locking dogs in position to engage in one of the grooves of said landing section, whereby longitudinal movement of the expander means relative to said dogs expands said dogs into locking engagement in said groove; said selective stop member having a selector key portion thereon adapted to engage in the one of the grooves of the selected landing section, said selector key portion having a lateral dimension greater than the depth of corresponding grooves in non-selected landing sections connected above said selected landing section in the pipe, whereby the stop shoulder of said selective stop member is prevented from engaging the upwardly facing stop shoulders of non-selected landing sections.

8. A device for releasably anchoring a well tool at a selected level within a well pipe comprising: a carrier; locking means on said carrier expandable and retractable laterally thereof; means on said carrier movable to expand said locking means; a selector member on said carrier movable laterally of said carrier; means biasing said selector member outwardly of said carrier; said selector member having outwardly convergent surfaces at its upper and lower ends and an outwardly extending abrupt stop shoulder intermediate said convergent surfaces; said selector member also having a downwardly facing upwardly and outwardly inclined shoulder above said stop shoulder and an upwardly facing downwardly and outwardly inclined shoulder below said stop shoulder, the lateral dimension of the selector member above said downwardly facing upwardly and outwardly inclined shoulder and below said upwardly facing downwardly and outwardly inclined shoulder being greater than the lateral dimension of the selector member at the stop shoulder.

9. A device for releasably anchoring a well tool at a selected level within a well pipe comprising: a carrier; locking means on said carrier expandable and retractable laterally thereof; means on said carrier movable to expand said locking means; a selector member on said carrier movable laterally of said carrier; means biasing said selector member outwardly of said carrier; said selector member having an abrupt stop shoulder formed on its outer face intermediate its ends; said selector member being provided with guide bosses above and below said stop shoulder on the outer face of said selector member, said guide bosses each having outwardly convergent beveled upper and lower faces.

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