

Oct. 13, 1959

C. M. SCHWAB

2,908,333

WELL TOOLS

Filed March 8, 1956

4 Sheets-Sheet 1

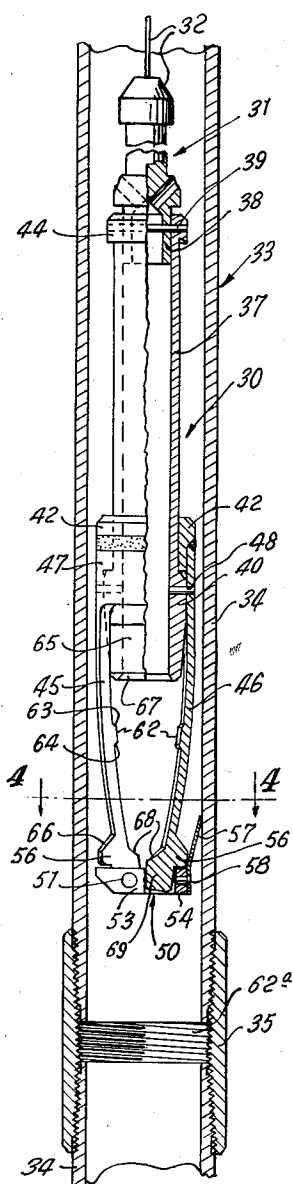


Fig. 1

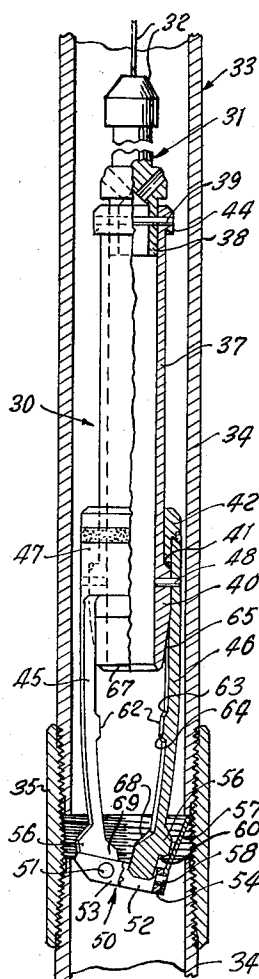


Fig. 2

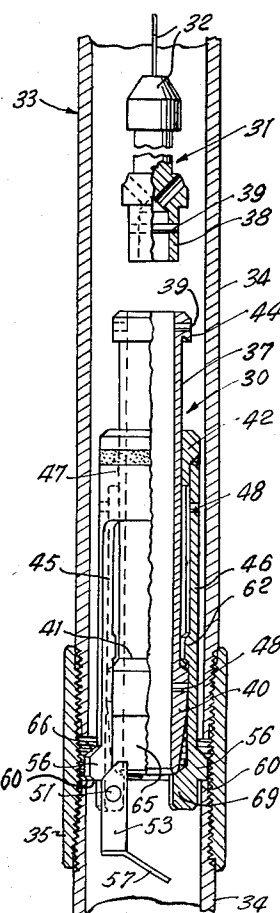


Fig. 3

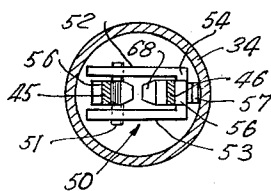


Fig. 4

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Exhausting Ackerly

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4 Sheets-Sheet 2

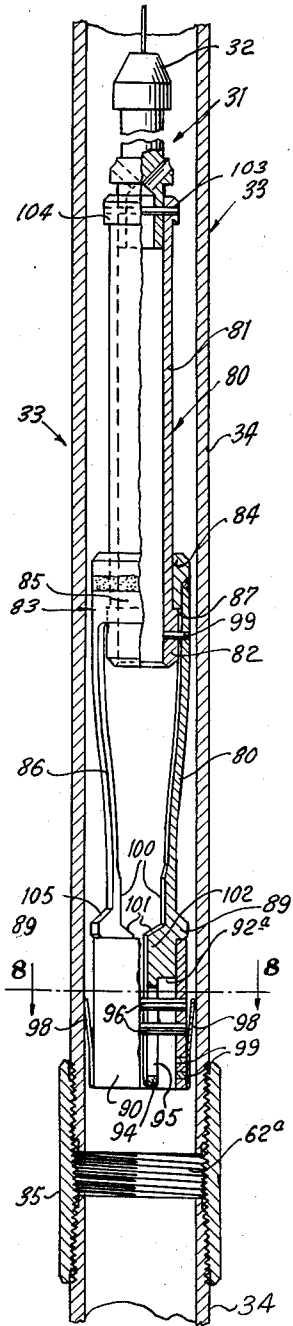


Fig. 5

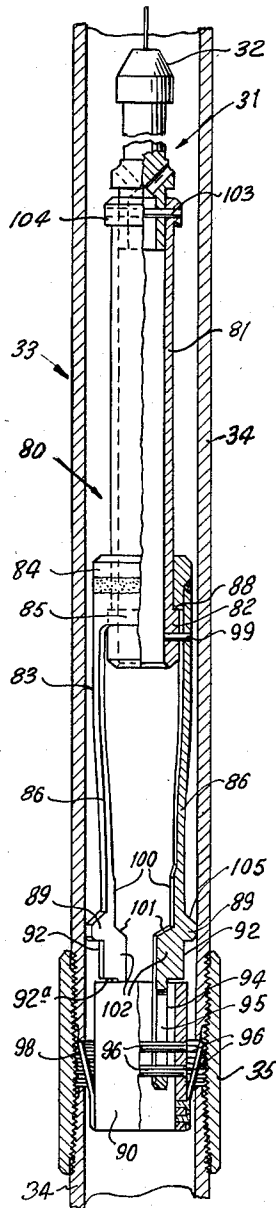


Fig. 6

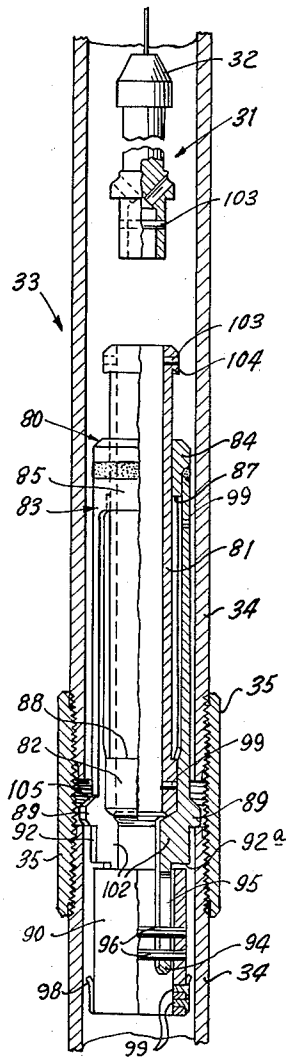


Fig. 7

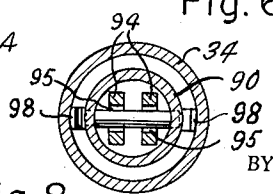


Fig. 8

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4 Sheets-Sheet 3

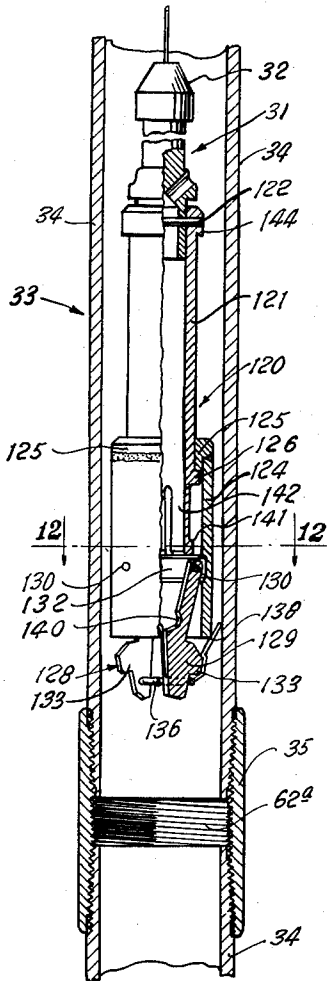


Fig. 9

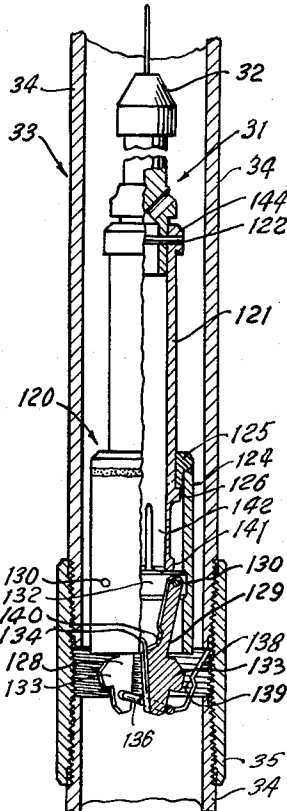


Fig. 10

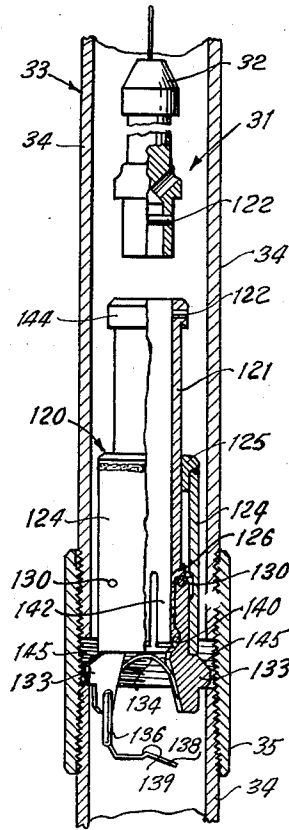


Fig. 11

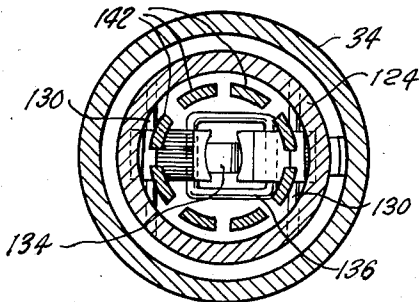


Fig. 12

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WELL TOOLS

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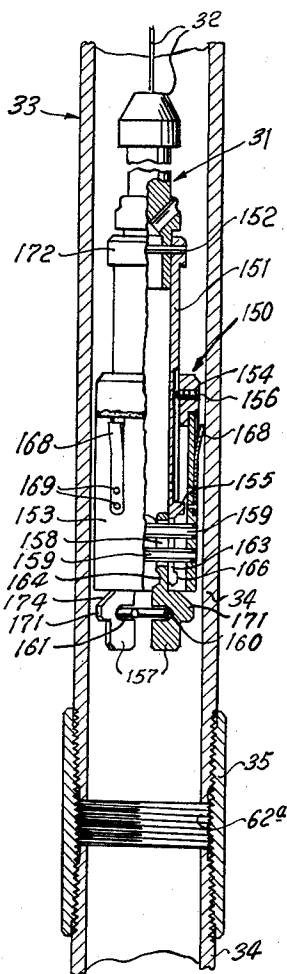


Fig. 13

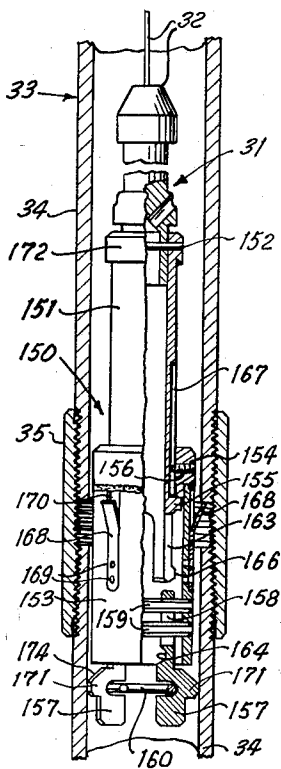


Fig. 14

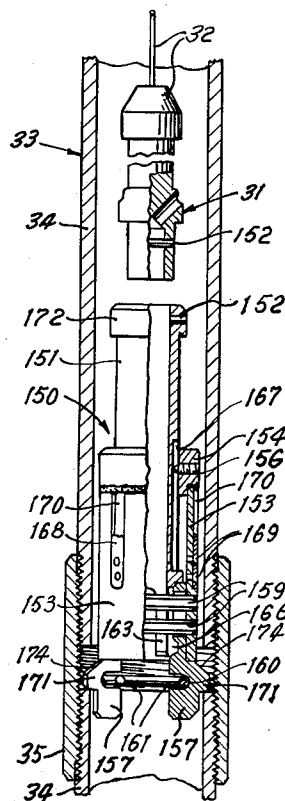


Fig. 15

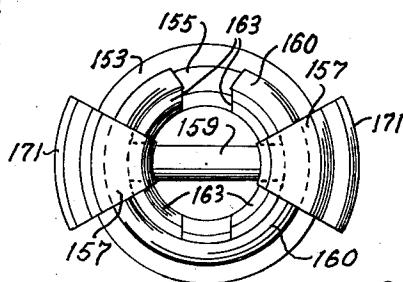


Fig. 16

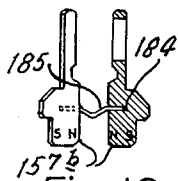


Fig. 18

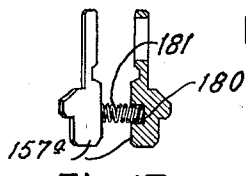


Fig. 17

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2,908,333

WELL TOOLS

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Application March 8, 1956, Serial No. 570,292

17 Claims. (Cl. 166—218)

The invention relates to well tools and more particularly to a stop which may be positioned at a selected position in a well flow conductor or tubing string to prevent downward movement therepast of well tools or the like.

One object of this invention is to provide a new and improved stop which can be locked in a selected position in a well conductor or tubing string.

Another object is to provide a stop, of the type described, which may be lowered into the well conductor and locked in a selected position therein by means of a running tool which can be lowered into the conductor and operated by means of a flexible line or member.

Still another object is to provide a stop, of the type described, which may be locked in position at any collar recess of a well conductor or any other internal annular recess thereof.

A further object of the invention is to provide a stop, of the type described, having means for positively locking the stop in position in the well conductor against movement in either a downward or an upward direction.

A still further object is to provide a stop having locking dogs held in retracted positions by a keeper which is movable downwardly to release the dogs for movement to expanded locking positions by a trip which engages a downwardly facing shoulder of a well conductor upon upward movement of the stop in the well conductor.

Another object is to provide a stop, of the type described, which is simple in structure and operation, thus minimizing possibilities of malfunction and increasing economy of manufacture and maintenance.

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

Figure 1 is a vertical partly sectional view of one form of the stop embodying the invention shown as it appears as it is lowered in a well conductor;

Figure 2 is a view similar to Figure 1 showing the trip of the stop engaging the bottom end of a well conductor section whereby an upward pull will release the dogs;

Figure 3 is a view similar to Figure 1 showing the stop locked in position in the well conductor.

Figure 4 is a horizontal sectional view taken on line 4—4 of Figure 1;

Figure 5 is a vertical partly sectional view of another form of the stop showing it as it appears as it is lowered in a well conductor;

Figure 6 is a view similar to Figure 5 showing the trip of the stop engaging the bottom end of a section of the conductor whereby an upward pull will release the dogs;

Figure 7 is a view similar to Figure 5 showing the stop locked in position in the well conductor;

Figure 8 is a horizontal sectional view taken on line 8—8 of Figure 5;

Figure 9 is a vertical partly sectional view of another form of the stop showing it as it appears as it is lowered in a well conductor;

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Figure 10 is a view similar to Figure 9 showing the trip of the stop engaging the bottom end of a section of the conductor whereby an upward pull will release the dogs;

Figure 11 is a view similar to Figure 9, showing the stop locked in position in the well conductor;

Figure 12 is a horizontal sectional view taken on the line 12—12 of Figure 9;

Figure 13 is a vertical partly sectional view of still another form of the stop showing the stop as it appears as it is lowered in a well conductor;

Figure 14 is a view similar to Figure 13 showing the trip of the stop engaging the bottom end of a section of the conductor whereby an upward pull will release the dogs;

Figure 15 is a view similar to Figure 13 showing the stop locked in position in the well conductor;

Figure 16 is a bottom view of the collar stop when in the locking position of Figure 15;

Figure 17 is a partly sectional view of a modified form of dogs usable with the stop of Figures 13 to 15; and

Figure 18 is a partly sectional view of another modified form of dogs usable with the stop of Figures 13 to 15.

Referring now particularly to Figures 1 through 4 of the drawings, the stop 30 is shown being lowered by means of a running tool 31, which is secured to a flexible line running and pulling mechanism 32, into position in a well conductor or tubing string 33 having the usual sections 34 joined or connected at adjacent ends by collars or couplings 35. The stop 30 includes a tubular main body or mandrel 37 whose upper end receives the dependent reduced portion 38 of the running tool. The running tool is releasably secured to the stop body 37 by a shear pin 39.

The lower end of the stop body is enlarged to form an annular locking portion 40 which provides an upwardly facing stop shoulder 41 on which rests the lower edge of a split carrier or collet ring 42. The collet ring is welded in the upper end of the annulus 47 and is longitudinally slidable on the stop body 37 between the stop shoulder 41 and the external flange 44 on the upper end of the stop body.

A pair of resilient collet fingers 45 and 46 are dependent from the annulus 47 which in its lower position on the mandrel or body is disposed about the annular locking portion 40 of the stop body and is detachably secured thereto by means of shear pin 48. The collet fingers extend below the stop body and are held in inwardly flexed positions by a substantially U-shaped keeper 50 which is pivotally secured to the lower end of the collet finger 45 by a shaft 51. The lower end of the collet finger 46 is disposed between the legs 52 and 53 of the keeper and is engaged by the cross piece 54 thereof, so that the free lower ends of the collet fingers are held in inwardly flexed positions wherein the outwardly extending locking bosses or dogs 56 thereof are held out of engagement with the conductor or tubing.

A spring or trip 57 has its lower end rigidly secured to the cross piece 54 of the keeper 50 by means of a pin 58 and extends upwardly and outwardly to engage the inside wall of the conductor, whereby the keeper may be rotated downwardly about its shaft 51 to move the cross piece out of engagement with the lower end of the collet finger when the stop is moved upwardly to cause the upper free end of the trip to engage a downwardly facing shoulder of the conductor, such as the lower end of a tubing section 34.

The dogs 56 have downwardly facing stop shoulders 60 which are adapted to engage the upper end of a tubing section when the collet fingers are free to move to ex-

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panded position, to limit downward movement of the stop in the conductor after the keeper has been moved to its inoperative position.

The collet fingers are provided with inwardly extending retaining bosses 62 having beveled upper and lower shoulders 63 and 64, respectively, which permit the inwardly and downwardly beveled surface 65 of the locking portion 40 of the mandrel to engage the retaining bosses to pass below said collar bosses and hold the resilient collet fingers outwardly when the stop body is moved downwardly to its lower position relative to the collet fingers.

In use, the stop is lowered into a well conductor with all operative elements thereof in the position shown in Figure 1. The free end of the trip bears resiliently against the conductor wall as the stop moves downwardly, flexing outwardly into each collar recess 62a as it moves past it and then flexing inwardly when contacted by the upper end of the next lower tubing section.

When the stop reaches a position in the well where it is desired to locate it, the whole stop is moved upwardly until the free end of the trip enters into a collar recess and engages the lower end of the upper tubing section 34 at the collar recess. Continued upward movement of the stop then causes the trip to pivot the keeper downwardly, releasing the lower ends of the collet fingers and permitting them to move outwardly toward expanded positions, permitting the dogs 56 to enter the collar recess. The shoulders 60 of the dogs then engage the upper end of the lower tubing section and prevent any further downward movement of the collet fingers, the annulus 47 and the collet ring 42.

Downward jars are then imparted to the stop body or mandrel 37 by means of the flexible line running and pulling mechanism and running tool 31 to cause the pin 48 to shear and free the stop body or mandrel to move downwardly relative to the collet fingers. Further downward jars then move the stop body to the position shown in Figure 3, the collet fingers flexing outwardly as the locking portion engages the beveled upper shoulders 63 of the retaining bosses 62 and cams the collet fingers outwardly. The locking portion 40 is then positioned immediately behind or inwardly of the dogs 56 so that the lower ends of the collet fingers cannot flex inwardly sufficiently to allow the dogs 56 to move inwardly out of the collar recess.

Furthermore, the beveled lower end 67 of the locking portion of the body engages and rests upon the downwardly and inwardly inclined upper surfaces 68 of the inwardly projecting tips 69 of the collet fingers, so that such engagement limits downward movement of the body with respect to the collet fingers and the dogs carried thereby.

Further downward jars are then again applied to the running tool and stop body but downward movement of the stop body is now resisted by the engagement of the lock bosses with the tubing section and the engagement of the lower end of the body with the surfaces 68, and the shear pin 39 shears, freeing the running tool from the stop body. The running tool is then removed, leaving the stop in position in the well conductor.

The stop 30 is then held in position against both upward and downward movement by the dogs 56 which are in expanded positions in the collar recess. The upper shoulders 66 are beveled downwardly and outwardly so that when upward forces are exerted on the stop which tend to move the collet fingers upwardly, engagement of the shoulders with the lower end of the upper tubing section tends to cam the dogs and fingers inwardly but such inward movement thereof is prevented by the locking portion 40 of the stop body. The stop body 37 is held in this locking position against any upward forces exerted thereon by well fluids due to the engagement of the lock bosses 62 with the stop shoulder 41 of the locking portion.

It will particularly be seen that the abrupt shoulders

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60 of the locking bosses or dogs 56 are positively held in expanded locking position by the locking section 40 of the body, and that downward movement of the body is prevented by the engagement of the beveled lower end 67 of the body with the upwardly facing surfaces 68 of the inwardly extending finger tips 69. Thus, any well tool or other object lowered into or falling through the tubing will be stopped by engagement with the upper end of the body 37 of the stop.

It will be seen therefore that the stop 30 is firmly positioned in the well against both upward and downward movement and other well operations can then be carried on, the stop serving such purposes as may be necessary; e.g., supporting a well tool, preventing well tools from dropping through the conductor, etc.

When it is desired to remove the stop, a pulling tool is lowered into the well conductor until it engages the undercut annular flange 44 of the stop body 37. An upward pull is then exerted upon the body by means of the pulling tool, and the locking portion 40 moves past the retaining bosses 62, their lower beveled surfaces 64 camming the collet fingers outwardly during this movement while the engagement of the dogs 56, which are still held outwardly by the locking portion 40, with the lower end of the upper tubing section, prevents inward movement of the collet fingers. Once the locking portion 40 is again disposed above the retaining bosses 62, the lower ends of the collet fingers are again free to flex inwardly so that when the stop shoulder 41 again engages the lower end of the collet ring, the collet fingers will move inwardly as the beveled upper shoulders 66 of the dogs cam them inwardly upon encountering downwardly facing obstructions such as the lower ends of tubing sections thereabove. The stop can then be removed from the well, the keeper hanging inoperatively in the position shown in Figure 3.

In Figures 5 through 8 is shown a modified stop 80 including an elongate tubular stop body or mandrel 81 adapted to be detachably secured at its upper end to the running tool 31 and provided at its lower end with an enlarged annular locking portion 82. A collet member 83 is mounted on the stop body for limited longitudinal movement relative thereto and includes a split collar or ring 84 having its lower reduced portion disposed in and welded to a collet annulus 85 having dependent resilient collet fingers 86. The lower end 87 of the split ring abuts the upper shoulder 88 of the locking portion 82, while the collet annulus extends about and is readily slidable over the locking portion.

The collet fingers 86 are provided with outward locking projections or dogs 89. A tubular keeper 90 is slidably and frictionally mounted on the collet fingers immediately below the dogs, the lateral surfaces 92 of the lower ends of the collet fingers bearing against the inner wall of the keeper. Such engagement holds the lower ends of the collet fingers in inwardly flexed position whereby the dogs 89 are held in retracted position out of contact with the well casing.

The collet fingers have dependent extensions 94 provided with longitudinal slots 95 through which extend transverse pins 96 carried by the keeper. The pins 96 cooperate with the extensions to guide and limit downward longitudinal movement of the keeper relative to the collet fingers. Springs or trips 98 are secured to the lower outer wall of the keeper by pins 99, the free upper ends of the trips extending upwardly and outwardly and bearing resiliently against the wall of the well conductor.

The mode of operation of the stop 80 is similar to that of the stop 30 of Figures 1 to 5. Briefly, the stop is lowered to the desired position in the well conductor by means of a running tool 31, the trips 98 flexing inwardly upon meeting obstructions. When the desired position is reached, the running tool is raised until the trip 98 enters into a collar recess 62a and engages the lower end of a tubing section. Continued upward move-

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ment of the running tool then causes the collet fingers to move upwardly relative to the keeper until the surfaces 92 of the collet move out of engagement with the keeper, the shoulders 92a of the lower ends of the fingers then being above the upper end of the keeper and permitting the dogs to bear resiliently against the wall of the well conductor. Continued upward movement of the running tool then causes the lower pin 96 to engage the lower ends of the slots 95, and since the collet fingers can now no longer move upwardly with respect to the keeper 90, the springs or trips are broken off and fall to the bottom of the well.

The running tool and stop are then again lowered in the well conductor until the dogs 89 register with a collar recess 62a and enter therein, whereupon their engagement with the upper end of the lower tubing section at the collar recess prevents further downward movement of the collet member. Downward jars are then imparted to the running tool and stop body 81 to shear the pin 99 which secures the collet member in its upper or retracted position with respect to the stop body, and the stop body is then moved downwardly relative to the collet member until the locking portion 82 thereof engages the inwardly extending locking surfaces 100 of the collet fingers to prevent inward movement of the lower free ends of the collet fingers and the dogs 89 carried thereby. Since the lower end of the body engages the upwardly facing shoulders 101 of the inwardly extending tips or buttresses 102 to limit further downward movement of the body with respect to the collet fingers, further downward jars then shear the pin 103 which detachably secures the running tool to the stop body 81 and the running tool may then be removed upwardly, leaving the stop locked in position against both upward and downward movement.

When it is desired to remove the stop, a pulling tool is lowered to engage the undercut annular flange 104 on the upper end of the stop body and the stop body is moved upwardly relative to the collet member, moving the locking portion 82 out of engagement with the inner locking surfaces 100 of the collet fingers, thus permitting the lower ends of the collet fingers to flex inwardly when the beveled upper surfaces 105 of the dogs 89 encounter the downwardly facing lower end of the tubing sections thereabove, or other obstructions, and tend to cam the fingers inwardly. The dogs thenceforth do not prevent upward movement of the stop and it is then free to be removed upwardly from the well conductor.

In Figures 9 through 12, a modified stop 120 is illustrated which includes a stop body 121 detachably secured at its upper end to the running tool 31 by a shear pin 122. A tubular member 124 is mounted on the stop body for limited longitudinal movement relative thereto, said sleeve having a split ring 125 welded in its upper end to provide an internal annular flange which engages an external annular flange 126 on the lower portion of the stop body to limit downward movement of the sleeve on said body.

A pair of locking elements 128 and 129 are pivotally mounted adjacent their upper ends within and on the tubular member 124 by means of pins 130. The tubular member is provided with an internal annular recess 132 which provides room for pivotal movement of the upper ends of the locking elements.

The locking elements extend below the tubular member and have adjacent their lower ends outwardly extending bosses 133 which are biased apart toward expanded positions by a spring 134 whose ends are fixed, as by welding, to the locking elements. The locking elements are held in retracted positions against the force of the spring 134 by a keeper 136, substantially rectangular in form and pivotally mounted on the locking element 128, having its ends extending into apertures on either side thereof. The lower end of the locking element 129 extends through the keeper and is engaged thereby. A spring or trip 138 is secured to the keeper 136 and ex-

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tends upwardly and outwardly therefrom for engaging the well conductor for actuating the keeper. The trip has a double bend 139 formed therein to provide a catch for restraining the keeper in position holding the locking members retracted.

The locking elements have recesses 140 in their inner sides adapted to receive the locking lugs 141 of collet fingers 142 which extend downwardly from the stop body below the external flange 126. Such engagement of the lugs in the recesses 140 restrains the stop body in the lower or locking position.

In use, the stop 120 is lowered into the well conductor until it reaches a desired position and is then raised until the trip enters a collar recess 62a, whereupon the trip engages the lower end of the upper tubing section and causes the keeper to pivot downwardly and release the locking elements as upward movement of the stop is continued. When released, the locking elements are biased and pivot outwardly to move the locking bosses 133 into the collar recess.

Downward jars are then imparted to the stop body 121 to move the stop body downwardly relative to the locking elements 128 and 129 which are prevented from moving downwardly by the engagement of the dogs 133 with the upper end of the lower tubing section, as shown in Figure 11. During such downward movement the locking lugs 141 of the collet fingers 142 enter the recesses 140, the collet fingers first flexing inwardly upon engaging the locking elements and then outwardly as the lugs enter the recesses.

The collet fingers now prevent inward movement of the locking elements, thus insuring that the bosses remain in the collar recess. Additional downward jars then shear the pin 122, freeing the running tool for upward removal from the well.

When it is desired to remove the stop from the well, a pulling tool is lowered to engage the undercut annular flange 144 on the upper end of the stop body whereby the stop body can be pulled upwardly. Such upward movement of the stop body causes the collet fingers 142 to flex inwardly as the lock lugs leave the recesses 140 and free the locking elements for inward movement. Continued upward movement of the stop body 121 causes the flange 126 to engage the ring 125 and move the tubular member 124 upwardly. The beveled shoulders 145 now cam the bosses of the locking elements inwardly upon meeting obstructions, thus permitting the stop to be removed from the well flow conductor.

In Figures 13 through 16 is illustrated a further modified stop 150, which includes a stop body or mandrel 151 to whose upper end a running tool 31 is detachably secured by a shear pin 152. A tubular member or sleeve 153 is mounted on the stop body for limited longitudinal movement relative thereto, said tubular member having a split ring 154 welded in its upper end to provide an internal annular flange which is adapted to engage the external flange 155 on the lower portion of the stop body to limit downward movement of the tubular member thereon.

A pair of locking elements 157 have upper portions provided with longitudinal slots 158 through which transverse pins 159 carried by the tubular member extend. The pins 159 serve to guide lateral movement of the locking elements and also to limit longitudinal movement with respect to the tubular member.

The locking members are biased apart and outwardly by a split ring spring 160 which is disposed in internal recesses 161 formed on the inner side of the locking elements. The upper portion of the locking elements are initially disposed inwardly of collet fingers 163 dependent from the stop body, which fingers hold the locking elements in the retracted positions shown in Figure 13 while the stop is being lowered into the well casing. The collet fingers are also provided with external restraining lugs 166 which are adapted to enter

the recesses 164 in the inner sides of the locking elements as shown in Figure 15.

Springs or trips 168 are secured to the tubular member 153 by pins 169, the lower portions of the trips lying in vertical grooves 170 formed in the exterior of the tubular member and their upper portions extend outwardly and upwardly to resiliently engage the well conductor.

In use, the stop 150 is lowered into the well conductor until it arrives at a desired position therein, whereupon the stop is raised until the trips 168 enter a collar recess 62a and engage the lower end of the upper tubing section 34 whereby the tubular member is then held against any further upward movement. Continued upward movement of the running tool and stop body now moves the collet fingers 163 upwardly above and out of engagement with the locking elements 157 so that the spring 160 moves the locking elements outwardly toward expanded position until the bosses 171 thereof engage the tubing wall, as seen in Figure 14. Further upward movement of the stop body now causes the flange 155 to engage the under side of the ring 154 and the trips are broken, permitting the tubular member to again move upwardly with the stop body until the locking bosses on the locking elements enter the collar recess. Downward jars are then imparted to the stop body to move the collet fingers downwardly behind the locking elements until the restraining lugs 166 of the collet fingers enter the recesses 164 of the locking elements to prevent inward movement of the locking elements, thus holding the bosses thereof in the collar recess. The collet fingers are guided downwardly on each side of the transverse pin 159 by means of a threaded pin 156 which extends through one section of the ring 154, and has its tip engaged in a longitudinally extending groove 167 formed in the exterior wall of the mandrel 151, so that such longitudinal movement of the mandrel in the sleeve or tubular member is guided by the engagement of the tip of the pin with the slot. With the stop body in this lower position, the flange 155 of the stop body rests on the upper ends of the locking elements and further downward movement of said stop body is prevented thereby. Further downward jars then shear the pin 152, freeing the running tool for removal from the well. The stop 150 is then held in place against both upward and downward forces, since the collet fingers prevent inward movement of the locking elements.

When it is desired to remove the stop from the well, a suitable pulling tool is lowered to engage the undercut annular flange 172 on the upper end of the stop body 151 whereby the stop body may be pulled upwardly. During such upward movement the restraining lugs 166 are moved upward out of the recesses 164, the collet fingers flexing inwardly, and then above the locking elements and out of engagement therewith.

The flange 155 then engages the ring 154 and causes the tubular member 153 to move upwardly with the stop body, the beveled upper shoulders 174 on the upper ends of the bosses camming the locking elements inwardly against the resistance of the spring 160 upon meeting obstructions such as the lower ends of the tubing sections 34. The stop can thus be removed upwardly from the well.

In Figure 17 are shown modified locking elements 157a which may be used in place of the locking elements 157 of the stop 150, differing from the locking elements 157 only in having bores 180 for receiving the ends of the coiled spring 181 which is employed in place of the ring spring 160 to bias the locking element outwardly toward expanded position.

In Figure 18 are shown further modified locking elements 157b which may be used in place of the locking elements 157 of the stop 150, differing from the locking elements 157 only in having narrow slots or recesses 184 which receive the ends of a strip spring 185 which

is employed in place of the ring spring 160 to bias the locking elements apart and toward expanded positions.

Alternatively, the springs 185, 181 and 160 may be omitted entirely if the locking elements are permanently magnetized in such a manner that the magnetic fields thereof tend to move them apart. (See Figure 18.)

It will be seen that several different forms of the stop have been illustrated and described, each of which includes a stop body, a carrier member longitudinally movable on the stop body which carries locking elements, means for holding the locking elements in retracted positions until a trip engages a downwardly facing obstruction and releases the locking elements for outward movement toward expanded position, and a locking means on the stop body movable between the locking elements for holding the locking elements in expanded position.

The foregoing description of the invention is explanatory only, and changes in the details of the constructions 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 is claimed and desired to be secured by Letters Patent is:

1. A stop including: an elongate body; carrier means mounted on the body for limited longitudinal movement relative to the body, said carrier means having outwardly biased stop means for engaging internal shoulders of a well conductor to limit movement of the stop therethrough when said stop means is released from retracted position; a keeper holding the stop means in retracted position; and a trip secured to said keeper and extending outwardly and upwardly therefrom for actuating the keeper to free the stop means for movement toward expanded position, said trip engaging the well conductor when said body is moved upwardly in the well conductor to actuate the keeper out of holding engagement with the stop means whereby said stop means are free to move to expanded position; said body having a locking means thereon engageable with said stop means for preventing movement of such stop means from expanded position toward retracted position, said locking means engaging said stop means to prevent such movement of the stop means when the body is moved downwardly relative to the carrier means, said locking means being movable upwardly out of engagement with said stop means when the body is moved upwardly relative to the carrier means.

2. A stop including: an elongate body; carrier means mounted on the body for limited longitudinal movement relative to the body, said carrier means having outwardly biased stop means for engaging internal shoulders of a well conductor to limit movement of the stop therethrough when said stop means is released from retracted position; a keeper holding the stop means in retracted position; and a trip secured to said keeper and extending outwardly and upwardly therefrom for actuating the keeper to free the stop means for movement toward expanded position, said trip engaging a downwardly facing shoulder of the well conductor when said body is moved upwardly in the well conductor to actuate the keeper; said body having a locking means for preventing movement of the stop means from expanded position toward retracted position, said locking means being moved into engagement with said stop means to prevent movement of the stop means toward retracted position when the body is moved downwardly relative to the carrier means, said locking means being movable upwardly out of engagement with said stop means when the body is moved upwardly relative to the carrier means.

3. A stop including: an elongate body; carrier means mounted on the body for limited longitudinal movement relative to the body, said carrier means having outwardly biased stop means for engaging internal shoulders of a well conductor to limit movement of the stop therethrough when said stop means is released from retracted position; a keeper holding the stop means in retracted position; and

a trip secured to said keeper and extending outwardly and upwardly therefrom for actuating the keeper to free the stop means for movement toward expanded position, said trip engaging a downwardly facing obstruction of the well conductor when said body is moved upwardly in the well conductor to actuate the keeper; said body having a locking means on its lower end for engaging said stop means to prevent movement of said stop means from expanded position toward retracted position when said body is moved downwardly relative to said carrier means, said locking means being movable upwardly out of engagement with said stop means when the body is moved upwardly relative to the carrier means.

4. A stop including: an elongate body; carrier means mounted on the body for limited longitudinal movement relative to the body; releasable means for holding said carrier means in a lower position on said body; said carrier means having outwardly biased stop means for engaging internal shoulders of a well conductor to limit movement of the stop therethrough when said stop means is released from retracted position; a keeper holding the stop means in retracted position; and a trip secured to said keeper and extending outwardly and upwardly therefrom for actuating the keeper to free the stop means for movement toward expanded position, said trip engaging a downwardly facing obstruction of the well conductor when said body is moved upwardly in the well conductor to actuate the keeper.

5. A stop including: an elongate body; carrier means mounted on the body for limited longitudinal movement relative to the body; releasable means for holding said carrier means in a lower position on said body; said carrier means having outwardly biased stop means for engaging internal shoulders of a well conductor to limit movement of the stop therethrough when said stop means is released from retracted position; a keeper holding the stop means in retracted position; and a trip secured to said keeper and extending outwardly and upwardly therefrom for actuating the keeper to free the stop means for movement toward expanded position, said trip engaging a downwardly facing obstruction of the well conductor when said body is moved upwardly in the well conductor to actuate the keeper; said body having a locking means for preventing movement of the stop means from expanded position toward retracted position, said locking means preventing such movement of the stop means when the body is moved downwardly to a lower position relative to the carrier means.

6. A stop including: an elongate body; carrier means mounted on the body for limited longitudinal movement relative to the body; shearable means rigidly connecting said carrier means to said body for holding said carrier in a lower position on said body, said carrier means extending below said body; said carrier means having outwardly biased stop means disposed below said body for engaging internal shoulders of a well conductor to limit movement of the stop therethrough when said stop means is released from retracted position; a keeper holding the stop means in retracted position; and a trip secured to said keeper and extending outwardly and upwardly therefrom for actuating the keeper to free the stop means for movement toward extended position, said trip engaging a downwardly facing obstruction of the well conductor when said body is moved upwardly in the well conductor to actuate the keeper.

7. A stop including: an elongate body; carrier means mounted on the body for limited longitudinal movement relative to the body; shearable means rigidly connecting said carrier means to said body for holding said carrier in a lower position on said body; said carrier means having outwardly biased stop means for engaging internal shoulders of a well conductor to limit movement of the stop therethrough when said stop means is released from retracted position; a keeper holding the stop means in retracted position; and a trip secured to said keeper and

extending outwardly and upwardly therefrom for actuating the keeper to free the stop means for movement toward expanded position, said trip engaging a downwardly facing obstruction of the well conductor when said body is moved upwardly in the well conductor to actuate the keeper; said body having a locking means on its lower end for engaging said stop means to prevent movement of said stop means from expanded position toward retracted position when said body is moved downwardly to a lower position relative to said carrier means.

8. A stop including: an elongate body; a collet body mounted on the body for limited longitudinal movement relative to the body, said collet body having a plurality of resilient dependent fingers extending below said body and having outwardly extending stop means for engaging internal shoulders of a well conductor for limiting movement of the stop therethrough when the collet fingers are in expanded position; a keeper releasably holding the collet fingers in retracted position whereby said stop means are held out of engagement with the well conductor; a trip connected to said keeper and extending upwardly and outwardly whereby said trip engages a downwardly facing shoulder of the well conductor to actuate the keeper and release the collet fingers from retracted positions when the stop is moved upwardly in the well conductor; means selectively rigidly connecting said collet body to the elongate body for preventing relative movement therebetween; and locking means on said elongate body for engaging said collet fingers when the collet fingers are in expanded positions for preventing movement of the collet fingers toward retracted positions when the body is moved downwardly relative to the collet body.

9. A stop including: an elongate body; a collet body mounted on the body, said collet body having a plurality of resilient dependent fingers extending below said body and having outwardly extending stop means for engaging internal shoulders of a well conductor for limiting movement of the stop therethrough when the collet fingers are in expanded position; a keeper releasably holding the collet fingers in retracted position whereby said stop means are held out of engagement with the well conductor; and a trip connected to said keeper and extending upwardly and outwardly whereby said trip engages a downwardly facing shoulder of the well conductor to actuate the keeper and release the collet fingers from retracted position when the stop is moved upwardly in the well conductor.

10. A stop including: an elongate body; a collet body mounted on the body for limited longitudinal movement relative to the body, said collet body having a plurality of resilient dependent fingers extending below said body and having outwardly extending stop means for engaging internal shoulders of a well conductor for limiting movement of the stop therethrough when the collet fingers are in expanded position; a keeper releasably holding the collet fingers in retracted position whereby said stop means are held out of engagement with the well conductor; and a trip connected to said keeper and extending upwardly and outwardly whereby said trip engages a downwardly facing shoulder of the well conductor to actuate the keeper and release the collet fingers from retracted positions when the stop is moved upwardly in the well conductor; means selectively rigidly connecting said collet body to the elongate body for preventing relative movement therebetween; and locking means on said elongate body for engaging said collet fingers when the collet fingers are in expanded positions for preventing movement of the collet fingers toward retracted positions when the body is moved downwardly to a lower position relative to the collet body; said keeper being pivotally connected to one of said collet fingers.

11. A stop including: an elongate body; a collet body mounted on the body for limited longitudinal movement relative to the body, said collet body having a plurality of resilient dependent fingers extending below said body

and having outwardly extending stop means for engaging internal shoulders of a well conductor for limiting movement of the stop therethrough when the collet fingers are in expanded position; a keeper releasably holding the collet fingers in retracted position whereby said stop means are held out of engagement with the well conductor; a trip connected to said keeper and extending upwardly and outwardly whereby said trip engages a downwardly facing shoulder of the well conductor to actuate the keeper and release the collet fingers from retracted positions when the stop is moved upwardly in the well conductor; means selectively rigidly connecting said collet body to the elongate body for preventing relative movement therebetween; and locking means on said elongate body for engaging said collet fingers when the collet fingers are in expanded positions for preventing movement of the collet fingers toward retracted positions when the body is moved downwardly to a lower position relative to the collet body; said keeper comprising a tubular member slidably mounted on said collet fingers for limited longitudinal movement relative thereto, said tubular member engaging lateral sides of the collet fingers to hold the collet fingers in retracted positions when in an upper position on the collet fingers and allowing movement of the collet fingers toward expanded positions when in a lower position on the collet fingers.

12. A stop including: an elongate body; a collet body mounted on the body, said collet body having a plurality of resilient dependent fingers extending below said body and having outwardly extending stop means for engaging internal shoulders of a well conductor for limiting movement of the stop therethrough when the collet fingers are in expanded position; a keeper releasably holding the collet fingers in retracted position whereby said stop means are held out of engagement with the well conductor; and a trip connected to said keeper and extending upwardly and outwardly whereby said trip engages a downwardly facing shoulder of the well conductor to actuate the keeper and release the collet fingers from retracted positions when the stop is moved upwardly in the well conductor; said keeper comprising a tubular member slidably mounted on said collet fingers for limited longitudinal movement relative thereto, said tubular member engaging lateral sides of the collet fingers to hold the collet fingers in retracted positions when in an upper position on the collet fingers and allowing movement of the collet fingers toward expanded positions when in a lower position on the collet fingers.

13. A stop including: an elongate body; a carrier mounted on the body for limited longitudinal movement relative to the body; a plurality of stop means movably mounted on the carrier and biased outwardly for engaging internal shoulders of a well conductor for limiting movement of the stop therethrough; a keeper releasably holding the stop means in retracted position whereby the stop means are held out of engagement with the well conductor; a trip connected to the keeper and extending upwardly and outwardly whereby said trip engages a downwardly facing shoulder of the well conductor to actuate the keeper and release the stop means for outward movement from retracted position to expanded position when the stop is moved upwardly in the well conductor; means selectively rigidly connecting the carrier to the body for preventing relative movement therebetween; and locking means on the body for engaging the stop means when the stop means are in expanded positions for preventing movement of the stop means toward retracted positions when the body is moved downwardly to a lower position relative to the carrier.

14. A stop including: an elongate body; a carrier mounted on the body; a plurality of stop means movably mounted on the carrier and biased outwardly for engaging internal shoulders of a well conductor for limiting movement of the stop therethrough; a keeper releasably holding the stop means in retracted position whereby the

stop means are held out of engagement with the well conductor; and a trip connected to the keeper and extending upwardly and outwardly whereby said trip engages a downwardly facing shoulder of the well conductor to actuate the keeper and release the stop means for outward movement from retracted position to expanded position when the stop is moved upwardly in the well conductor; said stop means having their upper ends pivotally connected to the carrier; said keeper being pivotally connected to one of said stop means.

15. A stop including: an elongate body; a carrier mounted on the body; a plurality of stop means movably mounted on the carrier and biased outwardly for engaging internal shoulders of a well conductor for limiting movement of the stop therethrough; a keeper releasably holding the stop means in retracted position whereby the stop means are held out of engagement with the well conductor; and a trip connected to the keeper and extending upwardly and outwardly whereby said trip engages a downwardly facing shoulder of the well conductor to actuate the keeper and release the stop means for outward movement from retracted position to expanded position when the stop is moved upwardly in the well conductor; said stop means being biased outwardly by a spring disposed therebetween.

16. A stop including: an elongate body; a carrier mounted on the body for limited longitudinal movement relative to the body; a plurality of stop means movably mounted on the carrier and biased outwardly for engaging internal shoulders of a well conductor for limiting movement of the stop therethrough; said body having dependent resilient fingers engaging outer sides of the stop means to hold said stop means in retracted position; trip means on said carrier extending upwardly and outwardly whereby said trip engages a downwardly facing shoulder of the well conductor to allow the body to move upwardly relative to the stop means when the stop is moved upwardly in the conductor whereby said fingers are moved out of engagement with the stop means which are freed to move toward expanded positions; said fingers engaging inner surfaces of the stop means when the body is again moved downwardly relative to the carrier to prevent inward movement of the stop means toward retracted position.

17. A stop including: an elongate body; carrier means mounted on the body for limited longitudinal movement relative to the body; releasable means for holding said carrier means in a lower position on said body; said carrier means having outwardly biased stop means for engaging internal shoulders of a well conductor to limit movement of the stop therethrough when said stop means is released from retracted position; a keeper holding the stop means in retracted position; and a trip secured to said keeper and extending outwardly and upwardly therefrom for actuating the keeper to free the stop means for movement toward expanded position, said trip engaging a downwardly facing obstruction of the well conductor when said body is moved upwardly in the well conductor to actuate the keeper; said body having a locking means for preventing movement of the stop means from expanded position toward retracted position, said locking means engaging said stop means to prevent movement of the stop means toward retracted position when the body is moved downwardly relative to the carrier means, said locking means being movable out of engagement with said stop means when the body is moved upwardly relative to the carrier means.

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