

May 27, 1958

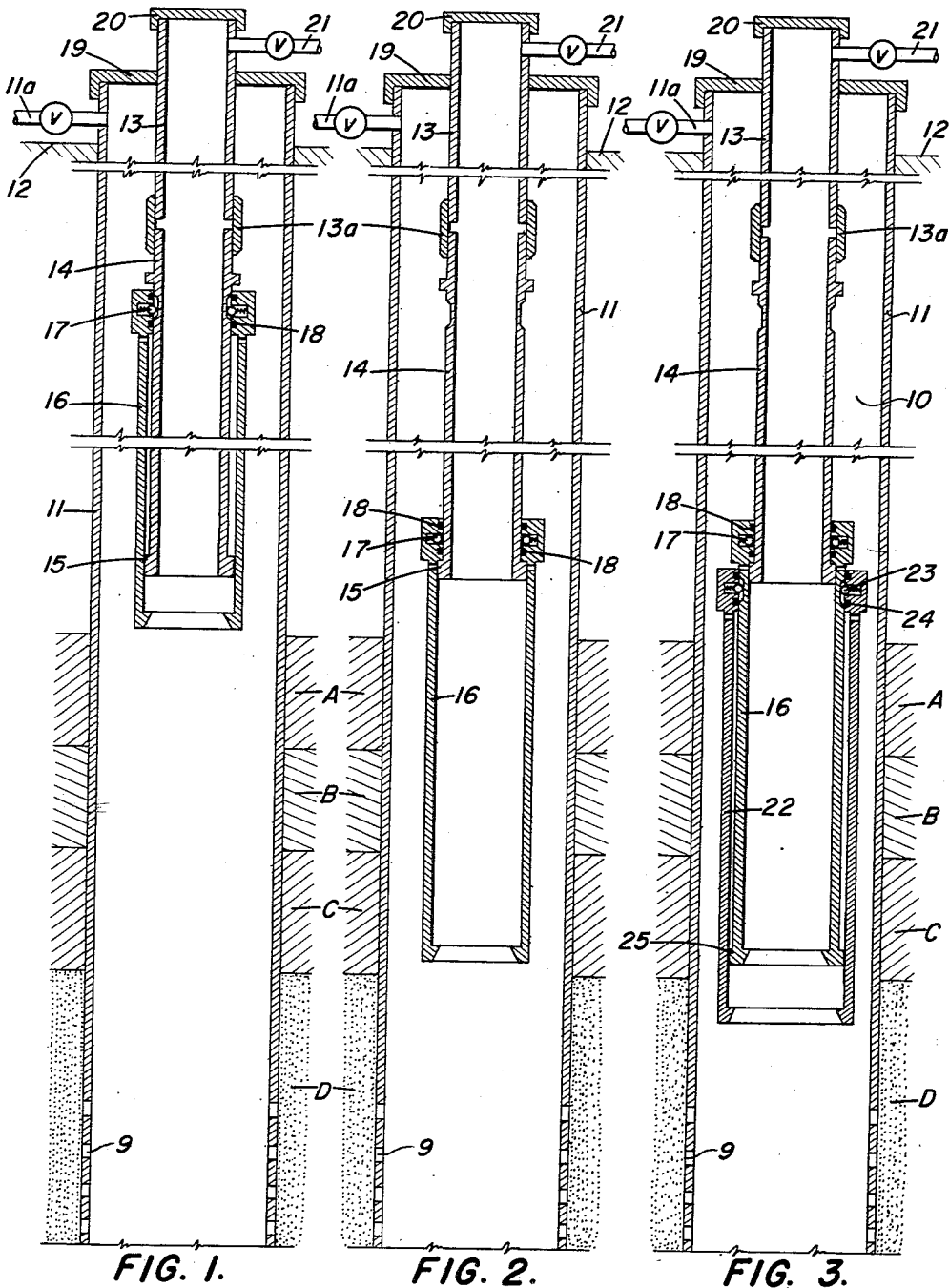
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2,836,247

EXTENSION OF EFFECTIVE LENGTH OF TUBING

Filed May 17, 1954

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

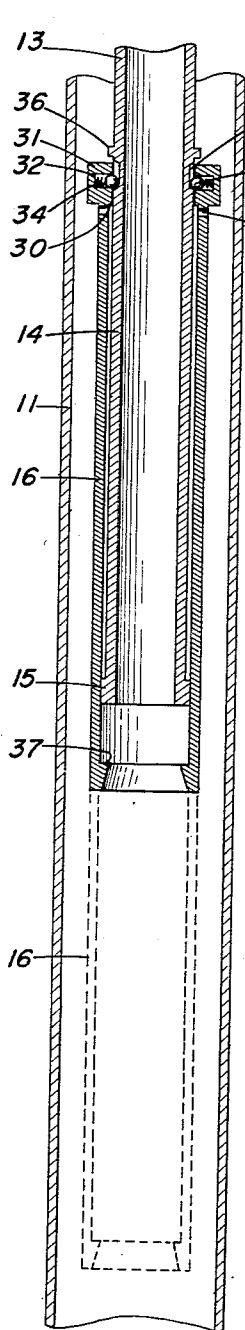


FIG. 4.

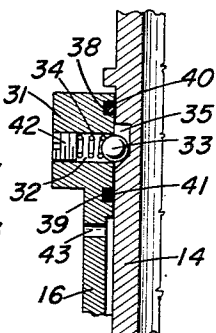


FIG. 5.

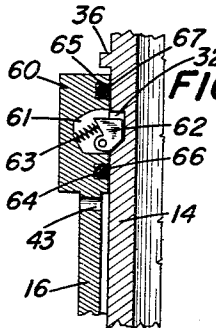


FIG. 8.

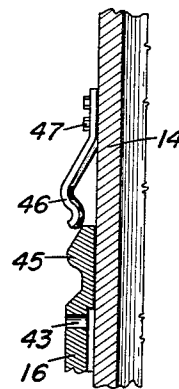


FIG. 6.

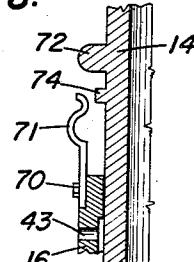


FIG. 9.

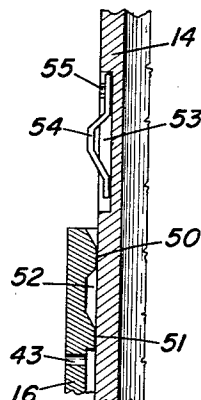


FIG. 7.

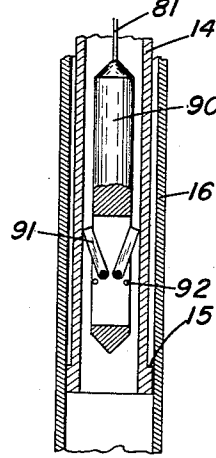


FIG. 12.

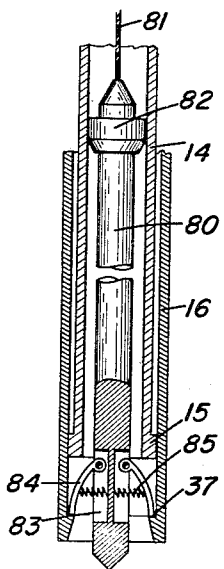


FIG. 10.

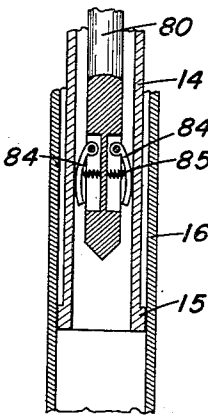


FIG. 11.

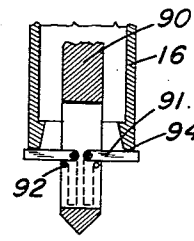


FIG. 13.

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EXTENSION OF EFFECTIVE LENGTH OF TUBING

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Application May 17, 1954, Serial No. 430,101

23 Claims. (Cl. 166—46)

The present invention is directed to apparatus for use in a well bore. More particularly, the invention is directed to apparatus for use in a cased and tubed well in which the tubing is permanently located in the well. In its more specific aspects, the invention is directed to apparatus for use on a tubing string in a cased well.

The present invention may be briefly described as a method and apparatus for lengthening the effective length of a tubing string which is permanently arranged in a cased well. The apparatus comprises a tubular mandrel which is adapted to be connected to the end of the tubing. Arranged and carried by the tubular mandrel on the exterior thereof in sliding relationship therewith is a tubular extension member having a diameter slightly greater than the external diameter of the mandrel. The extension member is normally held on the mandrel by a latching means (such as a shear pin) and the like. The extension member is provided with a seal for sealing between the mandrel and the extension member. The lower end of the mandrel is provided with a stop member to engage with the upper end of the extension member when the extension member is in an operative position.

The present invention is particularly adapted for use in a cased well wherein the tubing is arranged at a point in the casing a substantial distance above a level in the well at which certain operations, such as cementing, production, washing, recompleting and the like, are to be conducted. Specifically, the lower open end of the tubing including the mandrel of the present invention is arranged at a level in the well above the upper of a series of productive strata, sands, zones, intervals, or formations from which oil, gas, or other desirable earth fluids are to be obtained. When it is desired to increase the effective length of the tubing, the extension member which is normally held on the mandrel by a latch, and the like, is released to allow the extension member to move slidably downwardly on the mandrel until it engages with the stop member on the lower end of the mandrel. This will effectively lengthen the length of the tubing and the mandrel.

It is contemplated that the invention may comprise a plurality of extension members concentrically arranged on a tubular mandrel with each extension member being concentric to and of larger diameter than the extension member on which it is arranged thereby providing a series of inner and outer extension members. It is contemplated that the first of the extension members will be detachably latched to the tubular mandrel for support thereon and sealed thereagainst while the second of a series of extension members will be detachably latched to the next inner of the extension members by a suitable latch for support thereon and likewise provided with a seal. It is also contemplated that each of the inner of a plurality of extension members will be provided with a stop member in order to retain the outer of a series of extension members when the extension members are in an operative position.

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It will be clear from the foregoing brief description that the present invention allows the lengthening of the effective length of the tubing permanently set in a well to provide a full open, continuous passageway to a lower level in the well as is desired.

It is contemplated in the present invention that any one or all of a series of extension members may be retrieved and held against the tubular member or inner of a series of extension members in non-operative position as will be desired.

The present invention will be further illustrated by reference to the drawing in which:

Fig. 1 shows a tubing provided on its lower open end with a tubular mandrel attached thereto carrying an extension member on its outer surface in non-operative position;

Fig. 2 is a similar showing to Fig. 1 but illustrates the extension member in an operative position;

Fig. 3 is a similar showing to Fig. 1 but illustrates a plurality of extension members;

Fig. 4 is a sectional view of the apparatus with the tubular extension member arranged substantially co-extensive with the tubing;

Fig. 5 is a detailed sectional view showing the latching mechanism of Fig. 4;

Fig. 6 is a partial sectional view of another latching mechanism;

Fig. 7 is a partial sectional view of a still further latching mechanism;

Fig. 8 shows a latching dog for engaging the tubular extension with the mandrel;

Fig. 9 is a modification of Figs. 6 and 7 with a latching means arranged on the tubular extension member;

Fig. 10 illustrates a device for moving the extension member downwardly on the tubing;

Fig. 11 shows the device of Fig. 10 in lowering or raising position;

Fig. 12 is a view of a device being lowered through the tubing for raising the extension member; and

Fig. 13 shows the device of Fig. 12 in operative position.

Referring now to the drawing in which identical numerals will be employed to designate identical parts and specifically to Fig. 1, numeral 11 designates a casing lining a borehole which has been drilled from the earth's surface 12 to penetrate a plurality of formations A, B, C, and D from which hydrocarbon production may be had. The casing 11 has arranged therein a tubing 13 to which is attached a tubular mandrel 14. Tubing 13 is attached to mandrel 14 by means of coupling 13a. The tubular mandrel 14 forms the lower end of the tubing 13 and is provided with a stop member 15. Slidably carried on the tubular mandrel 14 is a light weight tubular extension member 16 which suitably may be constructed of a light weight metal such as aluminum or magnesium. The extension member 16 is latched to the mandrel 14 by means of a latch 17 and the inner surface of the extension member 16 is provided with a sealing means, such as an O-ring 18, to form a seal with the lower end of the tubular mandrel 14 when the upper end of the extension member comes to rest on the stop 15.

The casing is closed by a well head 19 at the earth's surface 12 and the tubing is closed in at the surface by suitable means 20. The tubing may be provided with a flow pipe, such as 21, and the casing with a pipe 11a as shown.

Referring now to Fig. 2, it will be seen that the latch 17 of Fig. 1 has been released and the extension member 16 has moved downwardly on the tubular mandrel 14 until the latch 17 is engaged with the stop 15 allowing the sealing means 18 to form a seal with the tubular

mandrel 14. It will be seen from Fig. 2 that the effective length of the tubing 13 has been lengthened such that the tubing extends substantially through formations A, B, and C.

Referring now to Fig. 3, the tubular mandrel 14 is connected to the tubing 13 by coupling means 13a and has arranged thereon an extension member 16, which, similar to Fig. 1, is provided with a latch 17 and a sealing means 18. The extension member 16 has slidably mounted thereon in sliding relationship a second extension member 22 which also may be of light weight metal, such as aluminum or magnesium, and has an internal diameter greater than the external diameter of the extension member 16.

The extension member 22 is attached to the extension member 16 by a latch, such as 23, and is sealed against the extension member 16 by means of a sealing member, such as an O-ring 24, on the inner surface of the extension member 22.

It is to be noted that in this instance the extension member 16 is provided on the lower end thereof with a stop member 25 which is similar to stop member 15 on the lower end of the mandrel 14.

Referring now to Figs. 4 and 5, the casing 11 has a tubing 13 arranged therein with the lower end of the tubing 13 defining mandrel 14. Arranged on the mandrel 14 and substantially co-extensive therewith is a tubular extension member which is designated by the numeral 16.

The lower end of the mandrel 14 is provided with a stop member 15 for engagement with an internal shoulder 30 of the extension member 16 when the latter is in an extended position, as shown by the dotted lines.

The upper end of the tubular extension member 16 defines an annular member 31 which is provided with an annular recess 32 in which is arranged a plurality of locking spheres 33 which are biased outwardly by biasing means, such as helical coil springs 34. As shown in Figs. 1 and 2, the locking spheres 33 engage and lock in a recess 35 of the mandrel 14.

The upper end of the mandrel 14 is provided with a stop member 36 which will resist upward travel of the extension member 16.

The lower end of the tubular extension member 16 has an inwardly projecting annular shoulder 37 for engagement of the lowering tool of Figs. 10 and 11 therewith as will be described.

It will be noted in the embodiments of Figs. 1 to 4 that the effective internal diameter of the extension member 16 is the same as the internal diameter of the tubing 13 and the mandrel 14.

Referring now to Fig. 5, it will be noted that the shoulder 31 is provided with recesses 38 and 39 in which are arranged, respectively, sealing means, such as O-rings 40 and 41, to effect a seal between the mandrel 14 and the tubular extension member 16. The spring 34 is held in the recess 32 by a set screw 42 for adjustment of tension on the spring 34.

It is to be noted in the apparatus of Figs. 4 and 5 that the extension member 16 is provided with vent ports 43 for release of any fluid which may be trapped between the mandrel 14 and the extension member 16.

Referring now to Fig. 6, it will be seen that the upper end of the tubular extension member 16 has been modified to provide an external shoulder 45 which is engageable with a spring means 46 attached to the mandrel 14 by means of hex-headed screws 47. In this particular embodiment, the spring means 46 acts as a stop and, therefore, the stop member 36 of Figs. 5 and 6 is not required.

Fig. 7 is a modification of the device of Fig. 6 and shows the upper end of the extension member 16 modified to provide internal shoulders 50 and 51 provided with a recess 52. The mandrel 14 has a recess 53 in

which is arranged a biasing means 54 attached to the mandrel 14 by hex-headed screws 55.

In the device of Fig. 8 the upper end of the tubular extension member 16 is provided with an annular shoulder 60 defining a recess 61 in which is arranged a pivoted latching dog 62 normally urged outwardly by means of a spring 63. The annular shoulder 60 is provided with recesses 64 and 65 in which are arranged sealing means, such as O-rings 66 and 67, respectively.

The upper end of the mandrel 14 in this embodiment is similar to the upper end of the embodiments of Figs. 4 and 5 and is provided with a recess 32 adapted to receive the dog 62.

In Fig. 9 the tubular extension member 16 has attached thereto by hex-headed screw 70 a latch spring 71 which is engageable with a latching shoulder 72 on the mandrel 14. In this particular embodiment a stop member 74 is provided below the shoulder 72 to restrict upward travel of the tubular extension member 16.

In Fig. 10 the mandrel 14 which forms part of the tubing 13 has a tool generally designated by the numeral 80 arranged therein on a wire line or cable 81. The tool 80 is provided adjacent its upper end with a packing means, such as a swab cup 82, which forms a seal with the inner surface of the mandrel 14. The tool 80 is provided with recesses 83 on its lower end in which are arranged pivoted dogs 84 which are biased outwardly from the recess 83 by biasing means, such as springs 85. In Fig. 10 the dogs 84 are biased into engagement with the shoulder 37.

In Fig. 11 the tool 80 is shown pulled up into the mandrel 14 which causes the dogs 84 to be forced inwardly against and compressing the springs 85.

Referring now to Figs. 12 and 13 a tool 90 is lowered through the tubing 13 and the mandrel 14 on a wire line, such as 81, for retrieving the tubular extension 16. This tool 90 is provided with a plurality of dogs 91 which are biased outwardly by biasing means, such as springs not shown. The latching dogs 91 are normally held upwardly in an inoperative position while in the tubing 13, mandrel 14, and extension member 16, as shown in Fig. 12, allowing them to spring outwardly and be held in a horizontal position by shear pins 92 on lowering through the extension member 16 to engage with the lower end 94 of the extension member 16 for raising same back upwardly on the mandrel 14, as will be described.

In operating the device of the present invention and specifically with reference to Figs. 4 to 13, the tubing extension member 16 is run into the well on a tubing 13 and specifically with the mandrel 14 in the position as shown in Figs. 1, 3, 4, 5 and 8. Thereafter a tool, such as 80, is run into the well through a lubricator, not shown, and then pumped downwardly, pump pressure being exerted on the swab cups 82 which serve as a piston and cause the tool 80 to be forced downwardly through the tubing 13 and the mandrel 14 until the tool 80 is forced out the lower open end of the mandrel 14. As the dogs 84 emerge from the open end of the mandrel 14, they are biased outwardly by the springs 84 and come to rest against the shoulder 37. By exerting pump pressure on swab cup 82, the tubular extension member is then pumped down until the shoulder 30 engages with the shoulder 15.

Thereafter operations, such as cementing, washing, treating and the like, may be conducted.

When it is desired to retrieve the tubular extension member 16, the tool 90 is lowered on wire line 81 until it issues from the open end of the tubular extension member 16 whereby the dogs 94 spring outwardly and engage with the lower end of the tubing extension 16. Thereafter upward pull on wire line 81 moves the tubular extension member 16 on the mandrel 84 upwardly until the latching means, such as those illustrated in Figs. 4, 5, 6, 7, 8 and 9 become engaged. Continued upward pull

on wire line 81 causes shear pins 92 to shear and the tool is then retrieved.

The operation sequence may be repeated as desired where a plurality of tubing extension members, each one telescoping on the other, is provided.

In the practice of the present invention it is contemplated that the effective length of the well tubing may be varied by mounting the elongated tubular member on the exterior surface of the tubing such that the tubing member and the tubing have a length which is substantially coextensive. Thereafter the tubular member is moved downwardly on the tubing at least a part of the length of the tubular member whereby the effective length of the tubing is extended. Thereafter fluid, such as fluid cementitious material, water, treating agent, such as acid and the like, may be flowed through the tubing either downwardly therein or upward therethrough when circulation is down the annulus and upwardly through the tubing. After such operations are conducted, the tubular member may be moved upwardly on the tubing at least the part of the length of the tubular member previously moved downwardly and latched again into position so that the length of the tube and the tubular member are substantially co-extensive. It is contemplated that the tubing extension member may be lowered only part of its length or raised only part of its length after being lowered its full length, as may be desired.

It will be seen from the foregoing description taken with the drawing that the device of the present invention may be released into operative position by means of wire line devices and retrieved into non-operative position.

The device of the present invention is quite useful in well completion operations wherein the tubing is located at a level substantially above the upper level of a series of producing strata. The present invention allows the effective length of the tubing to be lengthened to conduct operations at lower levels in the well, as desired. As an example, in the present invention production may be had from a lower of a series of producing strata, such as D, and after production has ceased or become uneconomical from the strata D, due to water invasion or gas encroachment, and the like, the extension member 16 may be lowered by unlatching the extension member 16 from the mandrel 14 to allow the effective length of the tubing to be extended to the strata D. Cement may then be pumped down into the area in formation or strata D which is to be sealed where the perforations 9 communicate with the strata D to cause sealing of the perforations.

In conducting the cementing operation, a low strength, low water-loss cement, such as disclosed in the patent to R. A. Salathiel, U. S. 2,482,459, may be used although other commercially available low strength, low water-loss cements may be employed. Pressure may be imposed on the cement to cause sealing of the perforations 9 with the formation of a plug therein, if desired. Thereafter the extension member 16 may be raised up on the mandrel 14 by lowering a wire line through the tubing 13 and the mandrel 14 to engage with a suitable engaging means on the interior thereof. After the extension member 16 has been latched against the latch 17 on the mandrel 14 a small tubing gun of a type well known to the art may be lowered on a wire line through the tubing 13 and fired to form perforations in the casing, well, or any one of the producing strata A, B or C, or at any level therein of the several strata as may be desired. The perforator may be a mechanical perforator or a gun perforator such as one employing bullets or one employing shaped charges. Thereafter, the extension member may be held on the mandrel 14 or lowered again to the zone or level from which production is to be had. These operations may be repeated as desired.

It is to be understood that other operations besides producing and cementing as have been described may be conducted with the apparatus of the present invention.

Thus it is contemplated that debris, such as sand and the like, which has accumulated in the well casing or tubing may be washed therefrom by lowering the tubular extension member to the desired level and flowing a washing liquid, such as oil, fresh or salt water, down the tubing and up the annulus, such as 31, between mandrel 14 and tubing 13 and the casing 11. Of course, it is appreciated that the washing operation or other operations may be conducted by reverse circulation with the flow being down the annulus 10 and up through the extension member 13, mandrel 14 and tubing 13 to the earth's surface 12.

The operations which may be conducted in accordance with the present invention may include acidizing, well stimulating, cementing, producing, and any of the many operations which are conducted in well completion and recompletion or servicing operations.

The invention, therefore, has wide utility as has been described and is particularly useful in well completion operations and workover jobs and has the feature, not found elsewhere, that the effective length of the tubing may be lengthened or shortened as desired and still maintain a full open, continuous passageway through which operations, such as gun perforating using a tubing gun, may be conducted, while maintaining the device in the well.

The present invention is, therefore, of great utility because a full opening is maintained for the tubing when its length is increased or decreased. In other words, when the tubular member is in the extended position, a tubing gun may be lowered through the tubing and the tubular member without requiring the removal of the tubular member or movement of same upwardly or downwardly on the mandrel.

The nature and objects of the present invention having been completely described and illustrated, what I wish to claim as new and useful and to secure by Letters Patent is:

1. Apparatus for use in well completion operations and the like which comprises a tubular mandrel member adapted to be connected to a tubing string, a tubular extension member slidably mounted on and extensible below said tubular mandrel member, releasable latching means on one of said tubular members cooperating with latching means on said other tubular member and supporting said tubular extension member in retracted position on said tubular mandrel member, and means on one of said tubular members cooperating with means on said other tubular member for maintaining the tubular extension member and tubular mandrel member in coupled relationship when the tubular extension member is in an extended position relative to said tubular mandrel member, said tubular extension member being movable slidably from retracted to extended position on release of said releasable latching means.

2. Apparatus in accordance with claim 1 in which the releasable latching means is on said tubular extension member.

3. Apparatus in accordance with claim 1 in which the releasable latching means is on the tubular mandrel member.

4. Apparatus in accordance with claim 1 in which the cooperating means comprises a stop member on the lower end of the mandrel and an internal shoulder on the upper end of the tubular member.

5. Apparatus in accordance with claim 1 in which the releasable latching means comprises at least one latching dog on the upper end of the extension member engageable with the latching means on said mandrel.

6. Apparatus in accordance with claim 1 in which the releasable latching means comprises means on said extension member biased into engagement with the latching means on said mandrel.

7. Apparatus in accordance with claim 1 in which the releasable latching means is a biasing means mounted on

the mandrel engaging with latching means on said extension member at its upper end.

8. Apparatus for use in well completion operations and the like which comprises a tubular mandrel member, coupling means attached to the upper end of said tubular mandrel member and adapted to be connected to a tubing string, a tubular extension member slidably and sealingly mounted on and extensible below said tubular mandrel member, releasable latching means on one of said tubular members cooperating with latching means on said other tubular member and supporting said tubular extension member in retracted position on said tubular mandrel member, and means on one of said tubular members cooperating with means on said other tubular member for maintaining the tubular extension member and tubular mandrel member in coupled relationship when the tubular extension member is in extended position relative to said tubular mandrel member, said tubular extension member being movable slidably from retracted to extended position on release of said releasable latching means.

9. Apparatus for use in well completion operations and the like which comprises a tubular mandrel member adapted to be connected to a tubing string, a tubular extension member slidably mounted on and extensible below said tubular mandrel member, sealing means carried by said tubular extension member for sealing between said tubular members, releasable latching means on one of said tubular members cooperating with latching means on said other tubular member and supporting said tubular extension member in retracted position on said tubular mandrel member, and means on one of said tubular members cooperating with means on said other tubular member for maintaining the tubular extension member and tubular mandrel member in coupled relationship when the tubular extension member is in extended position relative to said tubular mandrel member, said tubular extension member being movable slidably from retracted to extended position on release of said releasable latching means.

10. Apparatus for use in well completion operations and the like which comprises a tubular mandrel member, coupling means attached to the upper end of said tubular mandrel member and adapted to be connected to a tubing string, a tubular extension member slidably mounted on and extensible below said tubular mandrel member, sealing means carried by said tubular extension member on its upper end for sealing between said tubular members, releasable latching means on one of said tubular members cooperating with latching means on said other tubular member and supporting said tubular extension member in retracted position on said tubular mandrel member, and means on one of said tubular members cooperating with means on said other tubular member for maintaining the tubular extension member and tubular mandrel member in coupled relationship when the tubular extension member is in extended position relative to said tubular mandrel member, said tubular extension member being movable slidably from retracted position to extended position on release of said releasable latching means.

11. Apparatus for use in well completion operations and the like which comprises a tubular mandrel member adapted to be connected to a tubing string, a plurality of tubular extension members having successively larger diameters slidably mounted on and extensible below said tubular mandrel member, separate releasable latching means on each one of said tubular extension members cooperating with latching means on the next inner tubular extension member and supporting each of said tubular extension members in a retracted position on the next inner tubular extension member and on said tubular mandrel member, and means on each one of said tubular members cooperating with means on said next inner tubular member for maintaining the tubular extension mem-

bers and tubular mandrel member in coupled relationship when the tubular extension members are in extended position relative to said tubular mandrel member, each of said tubular extension members being movable slidably from retracted to extended position on release of each of said releasable latching means.

12. Apparatus in accordance with claim 11 in which the releasable latching means comprises at least one latching dog on the upper end of the extension member engageable with latching means on said mandrel.

13. Apparatus in accordance with claim 11 in which the releasable latching means comprises means on said extension member biased into engagement with latching means on said mandrel.

14. Apparatus in accordance with claim 11 in which the releasable latching means is a biasing means mounted on the mandrel engaging with latching means on the extension member at its upper end.

15. Apparatus for use in well completion operations and the like which comprises a tubular mandrel member, coupling means attached to the upper end of said tubular mandrel member and adapted to be connected to a tubing string, a plurality of tubular extension members having successively larger diameters slidably and sealingly mounted on and extensible below said tubular mandrel member, separate releasable latching means on each of said tubular extension members cooperating with latching means on the next inner tubular extension member and supporting each of said tubular extension members in a retracted position on the next inner tubular extension member and on said tubular mandrel member, and means on each one of said tubular members cooperating with means on said next inner tubular member for maintaining the tubular extension members and tubular mandrel member in coupled relationship when the tubular extension members are in extended position relative to said tubular mandrel member, each of said tubular extension members being movable slidably from retracted to extended position on release of each of said releasable latching means.

16. Apparatus for use in well completion operations and the like which comprises a tubular mandrel member adapted to be connected to a tubing string, a tubular extension member slidably mounted on and extensible below said tubular mandrel member, releasable latching means on one of said tubular members cooperating with latching means on said other tubular member and supporting said tubular extension member in retracted position on said tubular mandrel member, means on one of said tubular members cooperating with means on said other tubular member for maintaining the tubular extension member and tubular mandrel member in coupled relationship when the tubular extension member is in extended position relative to said tubular mandrel member, said tubular extension member being movable slidably from retracted to extended position on release of said detachable latching means, and means on the lower end of said tubular extension member adapted to be engaged by means lowerable through said mandrel member and said tubular extension member for releasing said releasable latching means and moving said tubular extension member from retracted to extended position.

17. A method for varying the effective length of a well tubing permanently arranged in a well casing with its lower open end above a plurality of hydrocarbon productive intervals in which an elongated tubular member is slidably mounted on a surface of said tubing such that the tubular member is substantially co-extensive with the tubing, and is extensible below the lower end of the tubing which comprises moving said tubular member downwardly on said tubing surface whereby the effective length of the tubing is extended, flowing fluid material through said tubing and through said tubular member while the tubular member is in said extended position, then moving said tubular member upwardly on said tubing surface to short-

en the effective length of the tubing, and then lowering a perforator through said shortened tubing and operating said perforator at a level below the shortened tubing but above the level reached by the extended tubing before it was shortened to form perforations in said casing in one of said hydrocarbon productive intervals.

18. A method in accordance with claim 17 in which the fluid material is cement.

19. A method in accordance with claim 17 in which the fluid material is a washing liquid.

20. A method in accordance with claim 17 in which the fluid material is acid.

21. A method in accordance with claim 17 in which hydrocarbons are produced through the perforations in the casing.

22. A method for conducting operations in a well in which a well tubing is permanently arranged in a well casing with the lower open end of the tubing above a plurality of hydrocarbon productive intervals, in which an elongated tubular member is slidably mounted on a surface of said tubing, such that the tubular member is substantially co-extensive with the tubing and is extensible below the lower end of the tubing, which comprises moving said tubular member downwardly on said tubing surface whereby the effective length of the tubing is extended, flowing fluid material through said extended tubing, lowering a perforator through said extended tubing, forming perforations in said casing with said perforator in a lower of said hydrocarbon productive intervals, flowing well fluids through said perforations into said well and through said extended tubing to the earth's surface, then moving said tubular member upwardly on said tubing surface to shorten the effective length of the tubing, and then lowering a perforator through said shortened tubing and operating said perforator at a level below the shortened tubing but above the lower of said hydrocarbon

productive intervals to form perforations in said casing in an upper of said hydrocarbon productive intervals.

23. A method for conducting operations in a well in which a well tubing is permanently arranged in a well casing with the lower open end of the tubing above a plurality of hydrocarbon productive intervals, in which an elongated tubular member is slidably mounted on a surface of said tubing, such that the tubular member is substantially co-extensive with the tubing and is extensible below the lower end of the tubing, which comprises moving said tubular member on said tubing surface whereby the effective length of the tubing is extended, lowering a perforator through said extended tubing, forming perforations in said casing with said perforator in a lower of said hydrocarbon productive intervals, flowing well fluids through said perforations into said well and through said extended tubing to the earth's surface, then moving said tubular member upwardly on said tubing surface to shorten the effective length of the tubing, and then lowering a perforator through said shortened tubing and operating said perforator at a level below the shortened tubing but above the lower of said hydrocarbon productive intervals to form perforations in said casing in an upper of said hydrocarbon productive intervals.

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