Aug. 1, 1961 G. H. TAUSCH ET AL 2,994,380

PLURAL COMPLETION OF WELLS

Filed May 5, 1958

4 Sheets-Sheet 1

FIG. 1a.

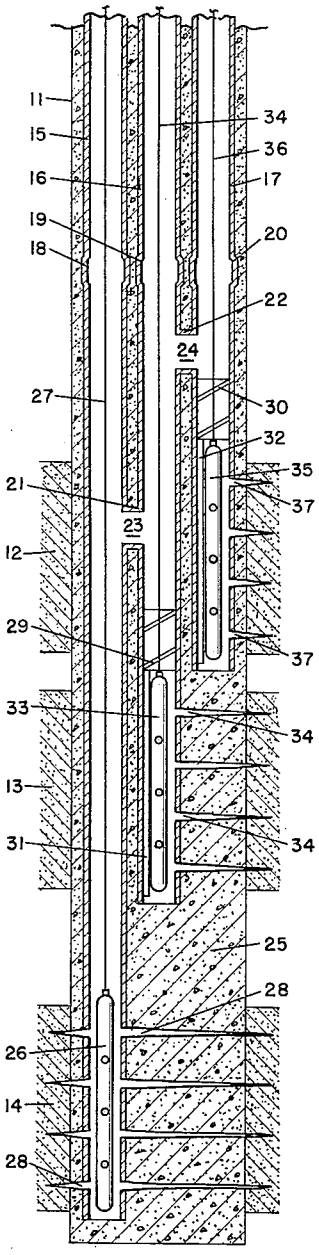


FIG. 1.

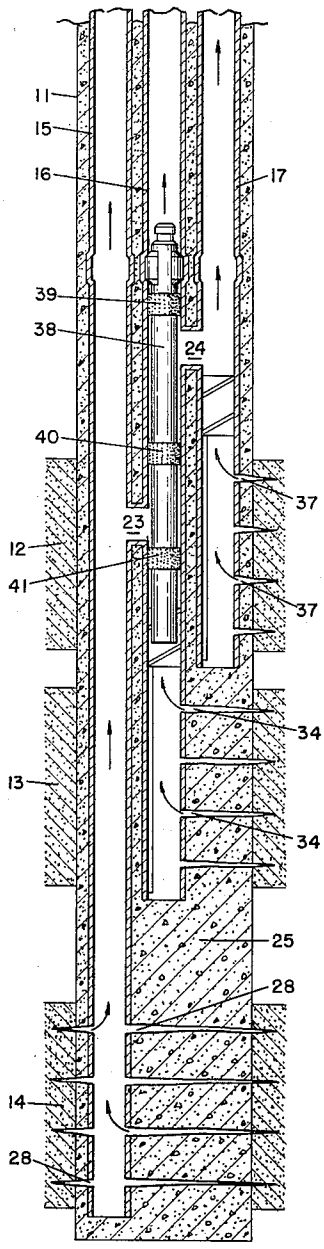
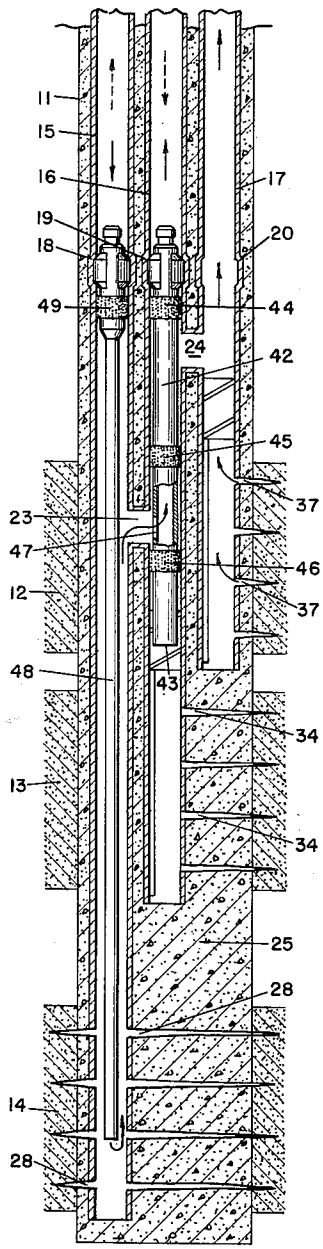


FIG. 2.



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FIG. 3.

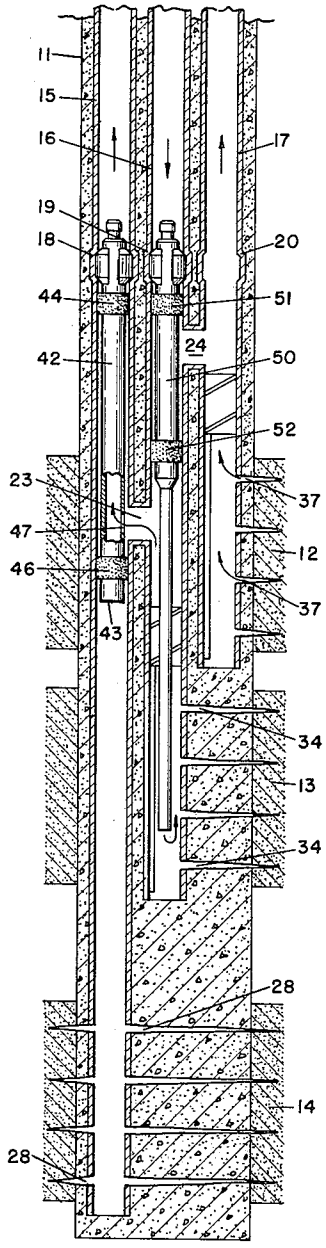
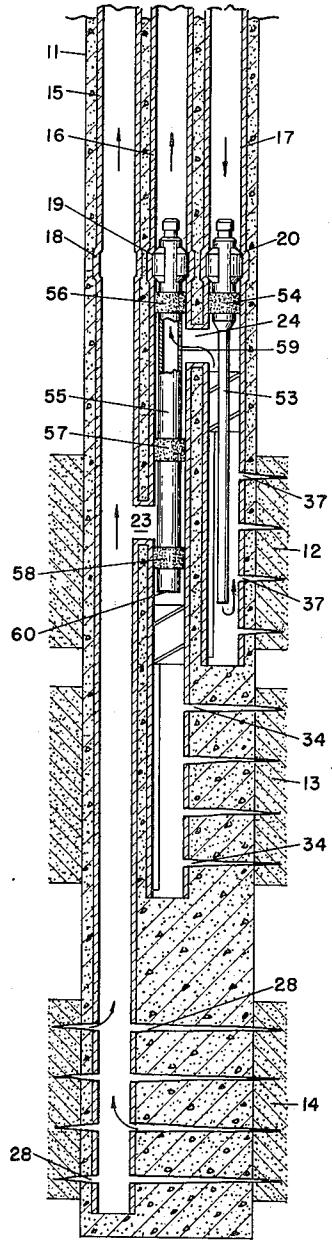


FIG. 4.



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PLURAL COMPLETION OF WELLS

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FIG. 7.

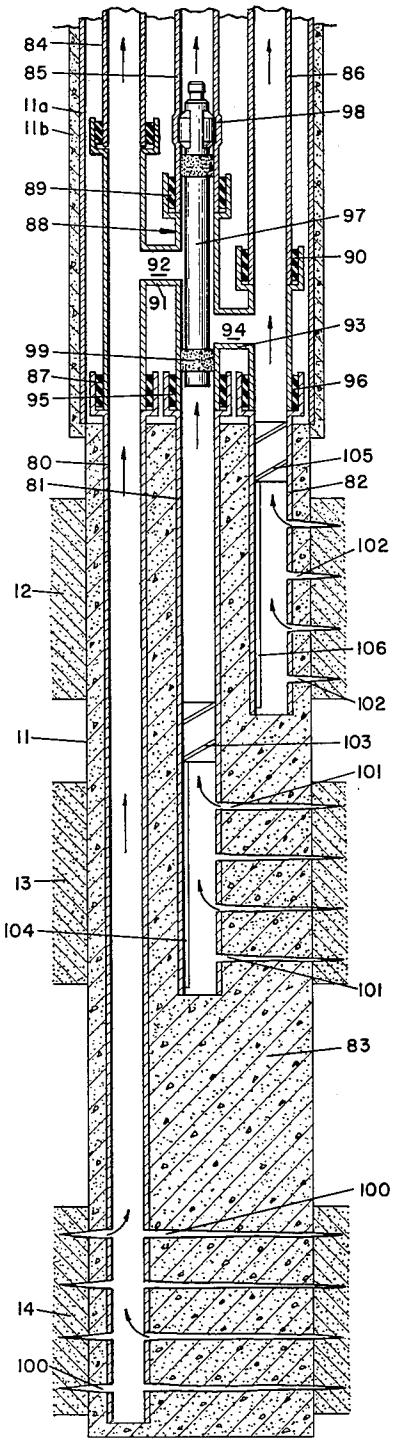
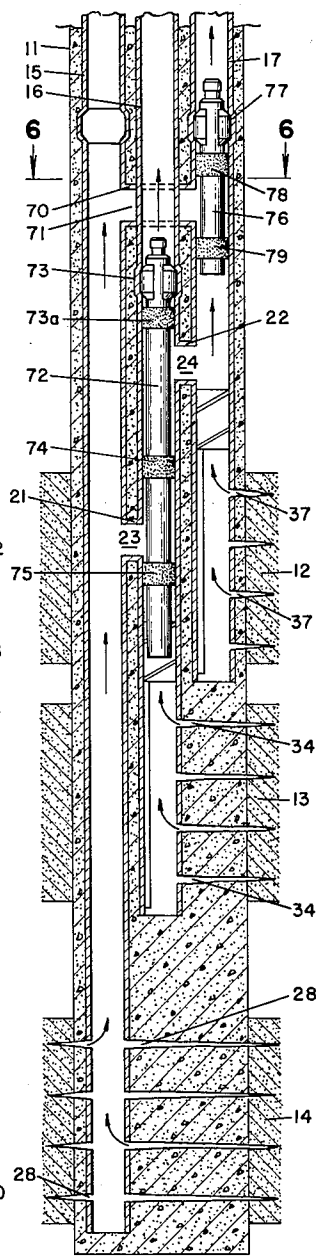


FIG. 5.



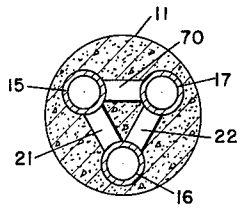


FIG. 6.

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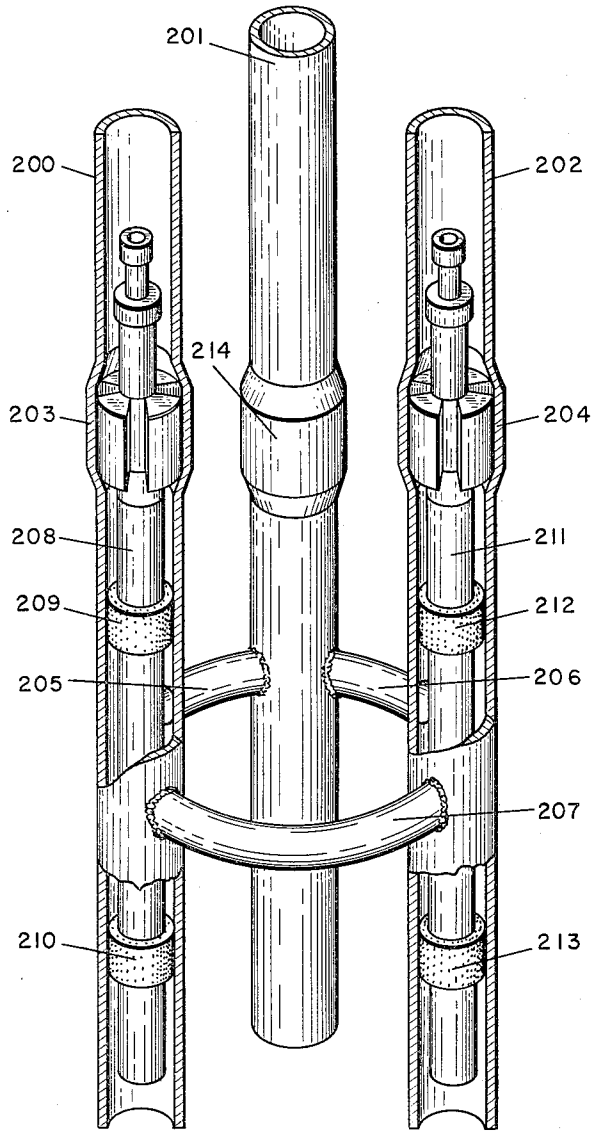


FIG. 8.

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United States Patent Office 2,994,380 Patented Aug. 1, 1961

2,994,380

PLURAL COMPLETION OF WELLS

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Filed May 5, 1958, Ser. No. 732,846
13 Claims. (Cl. 166—191)

The present invention is directed to apparatus and method for completing a well. More particularly, the invention is concerned with well completion operations in a plurality of vertically spaced apart hydrocarbon productive zones. In its more specific aspects the invention is concerned with completion and servicing of wells in a plurality of vertically spaced apart hydrocarbon productive zones in which fluid may flow simultaneously and separately through a plurality of pipe strings in said well.

The present invention may be briefly described as apparatus for completing a well which comprises three eccentrically positioned pipe strings arranged in a well bore and extending substantially parallel in said well from the earth's surface; first means connects the first of the pipe strings to the second of the pipe strings and provides a fluid passageway between the first and second pipe strings and second means spaced from the first connecting means connects the second of the pipe strings to a third of the pipe strings and provides a fluid passageway between the second and third pipe strings. Third means spaced vertically from the first and second means may be provided to interconnect the first and third pipe strings and provide a fluid passageway from the first to the third pipe string. Supporting means are provided in each of the pipe strings above the first and second connecting means or above the second and third connecting means. At least one retrievable conduit is sealingly positioned on a supporting means in one of the pipe strings with the tubular conduit extending in said one pipe string below said connecting means. Means are arranged in said one pipe string to seal between the tubular conduit and said one pipe string below the connecting means whereby fluid flow through each of the pipe strings is obtainable.

The present invention also involves a method for completing a well penetrating a plurality of productive subsurface earth strata which comprises arranging eccentrically in the well and extending from the earth's surface three fluidly interconnected, substantially parallel pipes, the first pipe being fluidly interconnected with the second pipe, and the second pipe being fluidly interconnected with the third pipe vertically spaced from the connection with the first pipe. The first pipe is also fluidly connected with the third pipe vertically spaced from the connections between the first and second and second and third pipes. Each one of the pipes is then perforated in one of three hydrocarbon productive zones vertically spaced from each other. Thereafter, a retrievable open ended tubular conduit is lowered in the second of the pipe strings and is sealingly positioned above the fluid interconnections with the other pipes to extend below the fluid interconnections. The tubular conduit is then sealed in the second pipe above and below the fluid interconnections and then hydrocarbons are separately flowed from said three zones through said pipes.

The present invention is quite advantageous and useful in that by means of the arrangement of apparatus, it is possible to complete, produce and service a well without arranging tubing strings therein and allowing all operations to be performed with wire line tools such as tubular conduits, perforators, and the like.

In the mode and embodiments of the present invention, it is possible to produce hydrocarbons, recomplete and service the well in the several zones, treat the well, seal perforated zones in the several pipe strings, conduct well stimulating operations, acidize and conduct the numerous treating operations which are performable in a well.

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

FIG. 1*a* is a diagrammatic showing of a well equipped in the manner set forth herein for perforating;

FIGS. 1 to 4 are a stepwise illustration of the practice of the present invention;

FIG. 5 is a further modification of the invention;

FIG. 6 is a view taken along the lines 6—6 of FIG. 5;

FIG. 7 is a still further modification of the invention; and

FIG. 8 is a isometric view with parts cut away of a further embodiment of the invention.

In the several figures of the drawing, the illustration and showing are intended to be and are schematic.

Referring now to the drawing, and particularly to FIG. 1*a*, numeral **11** designates a well bore drilled from the earth's surface to penetrate a plurality of subsurface earth zones, horizons, strata, sands, formations, and the like, some of which may be productive of hydrocarbons and others of which are non-productive. For purposes of illustration only, it may be assumed that zones **12, 13** and **14** are productive of hydrocarbons, while there may be other zones located between the several productive zones which are non-productive.

Arranged in the well bore **11** are three eccentrically positioned side-by-side parallel pipe strings **15, 16,** and **17**. The pipe strings **15, 16,** and **17** of the embodiments of FIG. 1*a*, and FIGS. 1 to 4, are substantially coextensive and extend to the earth's surface and terminate there in a suitable well head not shown. The pipe strings **15, 16** and **17** are each provided with a supporting means **18, 19** and **20** which suitably may be a landing nipple and other means for supporting a tool in a pipe string. The first pipe string **15** is interconnected by connection means **21** with the second pipe string **16** and the second pipe string **16** is interconnected by connecting means **22** with the third pipe string **17**. The connecting means **21** and **22** provide fluid passageways **23** and **24** for flow of fluid from one of the pipe strings to another of the pipe strings.

It may be seen that in the embodiments of FIG. 1*a*, and FIGS. 1 to 4, the three pipe strings are cemented in the well bore **11** with cement **25**.

In order to perforate the pipe string **15**, a perforator **26** is suitably lowered on a wire line **27** to the region of the zone **14** and there operated to form perforations **28** in the zone **14**. The perforator **26** may suitably be a bullet or shaped charge perforator but may be a chemical perforator or a mechanical perforator as may be desired.

In order to perforate the zones **12** and **13**, a perforator is lowered through the pipe strings **17** and **16** to a position adjacent the zones **12** and **13**. Since the pipe strings **15, 16,** and **17** are substantially co-extensive, means must be provided to avoid perforating the other pipe strings when the pipe strings **16** and **17** are being perforated. To this end the pipe strings **16** and **17** may be provided with, respectively, indexing means **29** and **30** and guide rails **31** and **32** for positioning a particular type of perforator or well tool on the guide rails **31** and **32**. Suitably, a perforator **33**, which may be one of the type as illustrated for perforator **26**, provided with track engaging means **33***a*, is lowered on a wire line **34** and positioned by indexing means **29** on the guide rail or track **31** and then operated adjacent the region or zone **13** to form perforations **34** into the formation **13**. Like-

wise, to perforate the pipe string 17 a perforator 35, provided with track engaging means 35*a*, which may be similar to perforator 33, is lowered on wire line 36 to a position adjacent the formation or zone 12 after being placed by indexing means 30 on track 32 and there operated to form perforations 37 penetrating into the formation or zone 12.

Equipment including the guide means, track member, and the perforator are described in U.S. Patent No. 2,781,098, issued to Walter J. Bielstein.

Thereafter, referring to FIG. 1, when production is desired from the several zones a tubular conduit 38 is lowered on one of the wire lines such as has been illustrated and positioned in the second pipe string 16 on the supporting means 19 and sealed therein by means of sealing means 39. The tubular conduit 38 is open ended and is sealed in the pipe string 16 with sealing means 40 positioned above the passageway 23 and below the passageway 24 with the sealing means 41 positioned below the passageway 23, the tubular conduit extending to a position below the connecting means 21 and 22. Thus, by means of the tubular conduit 38 and the sealing means 40 and 41, flow may then be obtained through the three pipe strings 15, 16, and 17 from zones 14, 13, and 12, flow from zone 12 proceeding up pipe string 17, flow from zone 13 proceeding up pipe string 16 through tubular conduit 38, while flow from the zone 14 is up the pipe string 15, the sealing means 40 and 41 and the seal 39 on the upper end of the tubular conduit 38 closing the passageways 23 and 24.

After production has been had from the three zones for a particular length of time, it may be necessary and desirable to work over the zone 14. For example, this workover operation may involve sealing the perforations 28 with fluid cement or washing sand from the region of the perforations 28. For purpose of illustration only, a fluid will be described as being flowed into the region of the perforations 28 and removed therefrom while production is continued through the pipe string 17.

In order to accomplish this series of operation, referring now to FIG. 2 a tubular conduit 42 having a closed lower end 43 is lowered in the pipe string 16 and positioned on the supporting means 19 and sealed therein with sealing means 44. Spaced apart on the tubular conduit 42 are sealing means 45 and 46, which are positioned to seal above and below the passageway 23. It is to be noted that the tubular conduit 42 is provided with a lateral passageway 47 which fluidly communicates with the passageway 23.

A second tubular conduit 48 is then lowered in the pipe string 15 and positioned on the supporting means 18 and sealed therein with sealing means 49. This tubular conduit 48 extends to the region of perforations 28 and allows flow therefrom or thereto. It is to be noted that the seals 45 and 46 close the passageway 24 in conjunction with the seal 44. Thus, flow may be had upwardly or downwardly through pipe string 15 and through tubular conduit 48 and through passageway 23 and through tubular conduit 42, flow proceeding in either direction as shown by the arrows, the closed lower end 43 closing off production from the zone 13. Thus, it is possible to wash out the zone 14 or to position a treating reagent therein or to conduct any operation as may be desired. For example, if the perforations 28 are sealed with cement, excess fluid cement may be removed with a washing operation and thereafter the zone 14 may be reperforated by lowering a gun perforator such as described in FIG. 1*a*.

If it is desired to work over the zone 13, an operation may be conducted as illustrated in FIG. 3.

Generally, this embodiment and mode are similar to the showing of FIG. 2. In this particular operation, however, where the zone 13 is to be reworked or serviced, a tubular conduit such as 42 having a closed lower end 43 is positioned on the supporting means 18 in pipe string 15 and sealed by means of sealing means 44, the seal 45 being omitted but the seal 46 sealing below the passageway 23 connecting with the pipe string 16. A second tubular conduit, in this instance tubular conduit 50, is lowered in pipe string 16 and sealingly positioned on the supporting means 19 with the seal 51 closing off the space between the pipe string 16 and the tubular conduit 50. The tubular conduit 50 is provided with a sealing means 52, which seals the pipe string 16 below the passageway 24 but above the passageway 23. By this arrangement of structural elements, it will be clear that production from zone 14 is closed off by the sealing means 46 and the closed lower end 43 of tubular conduit 42 and production from zone 12 may continue up the pipe string 17, but fluid may be flowed downwardly or upwardly from the zone 13 through the tubular conduit 50, for example, and thence through the passageway 23 and up the tubular conduit 42 through the lateral port 47 of the conduit 42. As noted, the flow may be downwardly through pipe string 15 and upwardly through pipe string 16 or downwardly through pipe string 16 and upwardly through pipe string 15.

When it is desired to rework the upper zone, a tubular conduit 53 is positioned on the supporting means 20 and sealed in the pipe string 17 with sealing means 54 and a tubular conduit 55 is positioned in the pipe string 16 on the supporting means 19 and sealed therein with sealing means 56, the tubular conduit 55 being provided with sealing means 57 and 58, which seal above and below the passageway 23 and below the passageway 24, allowing fluid communication with a lateral port 59 in the tubular conduit 55. In this mode and arrangement of the apparatus, it will be clear that production may continue from zone 14 while production from zone 13 is terminated by the closed lower end 60 of the tubular conduit 55. Flow may be had upwardly or downwardly through pipe strings 16 and 17, with flow being provided to the zone 12 or removed from the zone 12 as has been indicated, the seals 56 and 57 allowing the flow to proceed through the passageway 24 and lateral port 59 through the tubular conduit 55 into the tubing string 16 or in an opposite direction as may be desired.

Referring now to FIGS. 5 and 6, an embodiment is provided in which the three pipe strings 15, 16 and 17 are interconnected. Thus, as shown in FIGS. 5 and 6, pipe string 15 is connected to pipe string 16 by connecting means 21 forming passageway 23 and pipe string 16 is connected to pipe string 17 by connecting means 22 forming passageway 24. Pipe strings 15 and 17 are also interconnected by connection means 70 forming a passageway 71 between pipe strings 15 and 17. It is to be noted that the three connecting means are vertically spaced apart; however, the connecting means need not be spaced apart vertically.

Referring again to FIGS. 5 and 6, it will be seen that a tubular conduit such as 72 is arranged on a supporting means 73 above the passageway 24 and is suitably sealed in the pipe string 16 by sealing means 73*a*. The tubular conduit 72 is also provided with a sealing means 74 arranged above the passageway 23 in which it forms a seal with the wall of pipe string 16 at that point. The tubular conduit 72 is provided with a third sealing means 75 which seals between the wall of the pipe string 16 and the tubular conduit 72 at a point below the passageway 23. Thus, the tubular conduit 72, in cooperation with seals 73*a*, 74 and 75, serves to close off passageways 23 and 24 and allows fluid to pass upwardly through the pipe string 16 entering the zone 13 through the perforations 34.

In pipe string 17 a tubular conduit 76 is positioned therein on a supporting means 77 and is provided with a seal 78 to seal the wall of the pipe string 17, the seal 78 being arranged above the passageway 71. Likewise, the tubular conduit 76 is provided with a second seal 79 which forms a seal with the interior wall of pipe string 17 below the passageway 71, allowing fluid to be produced from zone 12 through perforations 37 upwardly

through tubular conduit **76** and pipe string **17** to the earth's surface. Production may also be obtained from zone **14** through perforations **28**, proceeding to the earth's surface through pipe string **15**.

Referring now to FIG. 7, a still further modification of the present invention will be described. In the modification of FIG. 7 there is shown a casing **11***a* extending to a position above the uppermost formation or zone **12** and cemented in place by cement **11***b*. In this modification only the lower sections of the pipe strings are cemented in the well bore **11**. The three eccentrically placed, substantially parallel pipes **80**, **81** and **82** comprise a bottom end assembly the pipes being properly aligned and clamped together as desired. The pipes **80**, **81**, and **82** are cemented in place in the well bore **11** by means of cement **83**. It is to be noted that the bottom assembly comprised of pipes **80**, **81** and **82** does not extend to the earth's surface and cement **83** only extends to a point sufficient to cement the pipes **80**, **81** and **82** in place. In order to achieve the desirable benefits of the present invention, retrievable pipe strings **84**, **85** and **86** are run into the well bore **11** and are sealingly engaged with the pipes **80**, **81** and **82**, the pipe **84** sealingly engaging with the pipe **80** by means of a seal **87** and with a connecting assembly **88** by means of seal **87***a*. The pipe string **85** sealingly engages with the connecting assembly **88** by means of a sealing means **89**. The pipe string **86** also sealingly engages with the connecting assembly **88** by means of seal **90**. It is to be noted that the assembly **88** is fluidly connected to the pipe string **84** by connecting means **91** in assembly **88** forming a fluid passageway **92** and has a fluid passageway means **93** providing a passageway **94**. The connecting means **88** sealingly engages with the pipe string **81** by means of a seal **95** and with the pipe string **82** by means of seal **96**.

Thus, with the pipe strings **80**, **81** and **82** cemented in the well bore **11** by cement **83** and the pipe strings **84**, **85** and **86** being run into the well bore and sealingly engaged with the pipe strings **80**, **81** and **82**, the advantage of retrievable pipe strings is provided with retrievable seal assemblies and interconnecting fluid passageways. The connecting assembly **88** may be connected with the pipe string **84**, but it is within the purview of this invention to provide a separate connecting means **88**, as shown, which may be lowered into the well bore **11** and engage sealingly both with the pipe strings **80**, **81** and **82** and the pipe strings **84**, **85** and **86**.

The seals are preferably carried on an element which is retrievable from the well but may be carried on either of the elements. Thus seals **87**, **95**, and **96** are preferably carried by the connecting assembly **88** while the seals **87***a*, **89** and **90** are preferably carried by the pipe strings **84**, **85**, and **86**, respectively.

Referring now to FIG. 8, numerals **200**, **201**, and **202** designate 3 substantially parallel pipe strings arranged in a well. Pipe strings **200** and **202** have supporting means such as landing nipples **203** and **204** arranged therein. Pipe string **201** has a supporting means arranged therein adjacent the supporting means **203** and **204**.

The three pipe strings **200**, **201**, and **202** are fluidly interconnected by connecting means **205**, **206**, and **207** arranged at the same level which provides a fluid passageway between each pipe string and the other two pipe strings. Shown in pipe string **200** is a retrievable tubular conduit **208** which is positioned on the supporting means **203** and which is provided with seals **209** and **210** arranged above and below the conduits **205** and **207**. Arranged in the pipe string **202** on the supporting means **204** is a tubular conduit **211** which has a sealing means **212** arranged above the conduits **206** and **207** and a second sealing means **213** arranged below the conduits **206** and **207**.

In pipe string **201** a supporting means **214**, similar to supporting means **203** and **204**, is provided above the conduits **205** and **206** and is designed to receive a tubular conduit, not shown, such as **208** or **210** with the tubular conduit carrying seals like the tubular conduits **208** and **210**.

The embodiment of FIG. 8 may be employed similarly to the embodiments of FIGS. 5, 6, and 7. In this particular arrangement where the connecting means or conduits **205**, **206**, and **207** are arranged at the same level, it is possible to dispense with a sealing means on one of the tubular conduits arranged on the supporting means. Thus the three pipe strings **200**, **201**, and **202** may be used as shown for separate hydrocarbon production from vertically spaced apart zones. By eliminating the sealing means **213**, for example, production may continue through pipe string **200** while workover fluid may be flowed down the pipe string **202** and thence upwardly into connecting means **206** and thence through pipe string **201** to the earth's surface.

The embodiments of FIGS. 5, 6 and 7 may be employed similarly to the embodiments of FIGS. 1*a* and 1 to 4. The embodiment of FIG. 7 is advantageous in that plug-back operations may be facilitated by installing landing nipples or supporting means in the lower ends of pipe strings **84**, **85** and **86** or in the connecting means. As shown in FIG. 7 a tubular conduit member **97** is sealingly supported on support member **98** in the pipe string **85** above the passageway **92** and is sealed in the connecting means **88** by sealing means **99** below the passageway **94** and the passageway **92** allowing fluid production separately through the pipe strings **80** and **84**, **81** and **85**, **82** and **86**, respectively, from zones **14**, **13** and **12** through perforations **100**, **101** and **102** in the pipe strings **80**, **81** and **82**. The pipe strings **81** and **82**, respectively, are suitably provided with indexing means **103** and track members **104** and indexing means **105** and track member **106** as has been described for the other embodiment. Thus, in accordance with the embodiment of FIG. 7 and the modification of operation there illustrated, production installation is made in a partially cemented hole and interconnections and all sealing surfaces are retrievable. This is quite advantageous and useful in that considerable flexibility is provided.

It will be clear from the foregoing description taken with the drawing that a new and improved apparatus and method have been provided in which three zones may be simultaneously produced and may be separately worked over without requiring the use of any tools except wire line tools and without requiring the movement of pipe strings **15**, **16** and **17**. This is quite advantageous and useful in that lifting equipment except wire line lifting equipment is not required. It will be manifest also that the present invention eliminates the employment of tubing strings and a casing in a well bore and requires only the several pipe strings to allow production from three zones and workover of the three zones.

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

1. Apparatus for completing a well which comprises three eccentrically positioned substantially parallel pipe strings arranged in a well bore and extending in said well to the earth's surface, means intermediate their ends connecting each of said pipe strings to another of said pipe strings and providing a fluid passageway between the pipe strings, supporting means in said pipe strings above the connecting means, at least one retrievable tubular conduit positioned on the supporting means in one of the pipe strings in sealing engagement therewith above the connecting means, said tubular conduit extending in said one pipe string below said connecting means, and means sealing between said tubular conduit and said one pipe string below said connecting means.

2. Apparatus in accordance with claim 1 in which the three pipe strings are cemented in said well.

3. Apparatus in accordance with claim 1 in which a

lower section of each of said three pipe strings penetrating vertically spaced apart hydrocarbon productive zones is cemented in said well and an upper section of each of said three pipe strings is retrievably and sealingly connected to each of said lower sections.

4. Apparatus in accordance with claim 3 provided with a connecting means forming an intermediate section releasably connected to two of the upper sections and to two of the lower sections and in which sealing means are provided between the intermediate section and the upper and lower sections, said intermediate section being retrievable from the well.

5. Apparatus for completing a well which comprises three eccentrically positioned substantially parallel pipe strings arranged in a well bore and extending in said well to the earth's surface, means intermediate their ends connecting each of said pipe strings to another of said pipe strings and providing a fluid passageway between the pipe strings, supporting means in said pipe strings above the connecting means, at least one retrievable tubular conduit positioned on the supporting means in one of the pipe strings in sealing engagement therewith above the connecting means, said tubular conduit extending in said one pipe string below said connecting means, means sealing between said tubular conduit and said one pipe string below said connecting means, and guide means for positioning a tool in each of two of said pipe strings, the guide means in said two pipe strings being below the connecting means connecting said two pipe strings and being spaced vertically from each other.

6. Apparatus for completing a well which comprises three eccentrically positioned substantially parallel pipe strings arranged in a well bore and extending in said well to the earth's surface, first means intermediate their ends connecting the first of said pipe strings to the second of said pipe strings and providing a fluid passageway between the first and second pipe strings, second means intermediate the ends of the second and third pipe strings spaced vertically from the first connecting means connecting the second of said pipe strings to the third of said pipe strings and providing a fluid passageway between the second and third pipe strings, supporting means in said pipe strings above the first and second connecting means, at least one retrievable tubular conduit positioned on the supporting means in one of the pipe strings, said tubular conduit extending in said one pipe string below said connecting means, and means sealing between said tubular conduit and said one pipe string above and below said connecting means.

7. Apparatus for completing a well which comprises three eccentrically positioned substantially parallel pipe strings arranged in a well bore and extending in said well to the earth's surface, first means intermediate their ends connecting the first of said pipe strings to the second of said pipe strings and providing a fluid passageway between the first and second pipe strings, second means intermediate their ends spaced vertically from the first connecting means connecting the second of said pipe strings to the third of said pipe strings and providing a fluid passageway between the second and third pipe strings, supporting means in said pipe strings above the first and second connecting means, a first retrievable tubular conduit positioned on the supporting means in one of the pipe strings in sealing engagement therewith above the connecting means and extending in said one pipe string below said connecting means, said one pipe string having fluid passageways connecting to the other pipe strings, said first tubular conduit having a lateral port fluidly communicating with the first fluid passageway and provided with a means closing the lower end of said first tubular conduit, means sealing between said first tubular conduit and said one pipe string and isolating said port for fluid communication with the first fluid passageway, and a second retrievable tubular conduit positioned on the supporting means in a sealing engagement with a second of the pipe strings and extending in said second pipe string below the connecting means.

8. Apparatus for completing a well which comprises three eccentrically positioned substantially parallel pipe strings arranged in a well bore and extending in said well to the earth's surface, first means intermediate their ends connecting the first of said pipe strings to the second of said pipe strings and providing a fluid passageway between the first and second pipe strings, second means intermediate their ends spaced vertically from the first connecting means connecting the second of said pipe strings to the third of said pipe strings and providing a fluid passageway between the second and third pipe strings, supporting means in said pipe strings above the first and second connecting means, a first retrievable tubular conduit positioned on the supporting means in one of the pipe strings and extending in said one pipe string below said first connecting means, said first tubular conduit being provided with means closing said one pipe string and a lateral port fluidly communicating with one of the fluid passageways, means sealing between said first tubular conduit and said one pipe string above and below said first connecting means, a second retrievable tubular conduit positioned on the supporting means in a second of the pipe strings and extending below the second connecting means, and means sealing between said second tubular conduit and the second of said pipe strings above said second connecting means.

9. Apparatus for completing a well which comprises three eccentrically positioned substantially parallel pipe strings arranged in a well bore and extending in said well to the earth's surface, first means intermediate their ends connecting the first of said pipe strings to the second of said pipe strings and providing a fluid passageway between the first and second pipe strings, second means intermediate their ends spaced vertically from the first connecting means connecting the second of said pipe strings to the third of said pipe strings and providing a fluid passageway between the second and third pipe strings, supporting means in said pipe strings above the first and second connecting means, a first retrievable tubular conduit sealingly positioned on the supporting means in the first of the pipe strings in sealing engagement therewith above the first connecting means and extending in said first pipe string below said first connecting means, said first tubular conduit having a closed lower end and a lateral port fluidly communicating with the passageway between the second and first pipe strings, a second retrievable tubular conduit positioned on the supporting means in sealing engagement therewith above the connecting means in said second pipe string and extending in said second pipe string below said connecting means in said second pipe string, first means sealing between said first tubular conduit and said first pipe string below the first connecting means and second means sealing between the second tubular conduit and the second pipe string below the second connecting means but above the first connecting means.

10. Apparatus for completing a well which comprises three eccentrically positioned substantially parallel pipe strings arranged in a well bore and extending in said well to the earth's surface, first means intermediate their ends connecting the first of said pipe strings to the second of said pipe strings and providing a fluid passageway between the first and second pipe strings, second means intermediate their ends connecting the second of said pipe strings to the third of said pipe strings and providing a fluid passageway between the second and third pipe strings, third means intermediate their ends connecting the first of said pipe strings to the third of said pipe strings and providing a fluid passageway between the first and third pipe strings, supporting means in each of said pipe strings above said connecting means, at least one retrievable tubular conduit sealingly positioned on the supporting means in one of the pipe strings in sealing engagement therewith above the connecting means, said tubular con-

duit extending in said one pipe string below said connecting means, and means sealing between said tubular conduit and said one pipe string below said connecting means.

11. Apparatus in accordance with claim 10 in which the connecting means are spaced vertically from each other.

12. Apparatus in accordance with claim 10 in which the connecting means are arranged in the well at the same level.

13. Apparatus for completing a well which comprises three eccentrically positioned substantially parallel pipe strings arranged in a well bore and extending in said well to the earth's surface, first means intermediate their ends connecting the first of said pipe strings to the second of said pipe strings and providing a fluid passageway between the first and second pipe strings, second means intermediate their ends spaced vertically from the first connecting means connecting the second of said pipe strings to the third of said pipe strings and providing a fluid passageway between the second and third pipe strings, third means intermediat their ends connecting the first of said pipe strings to the third of said pipe strings spaced vertically from the second connecting means and providing a fluid passageway between the first and third pipe strings, supporting means in each of said

pipe strings above the connecting means, a first retrievable tubular conduit positioned on the supporting means in the second of the pipe strings in sealing engagement therewith above the connecting means between the second and third pipe strings, said first tubular conduit extending in said second pipe string below the connecting means between the first and second and between the second and third pipe strings, means sealing between said first tubular conduit and said second pipe string above and below said connecting means between the first and second pipe strings, a second retrievable tubular conduit positioned on the supporting means in the third pipe string in sealing engagement therewith above the connecting means between the first and third pipe strings, said second tubular conduit extending below the connecting means between the first and third pipe strings, and means sealing between said second tubular conduit and said third pipe string below said connecting means between the first and third pipe strings.

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