Aug. 13, 1968 D. D. WEBB 3,396,794

WASHOVER TOOL, PIPE CUTTER AND RETRIEVER

Original Filed Jan. 11, 1966 2 Sheets-Sheet 1

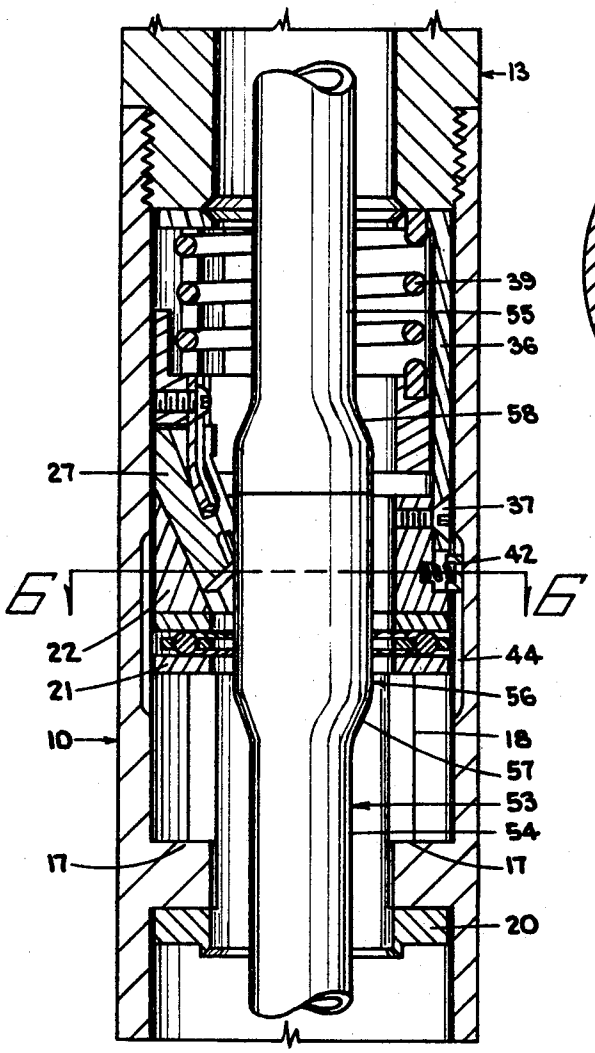


FIG 1

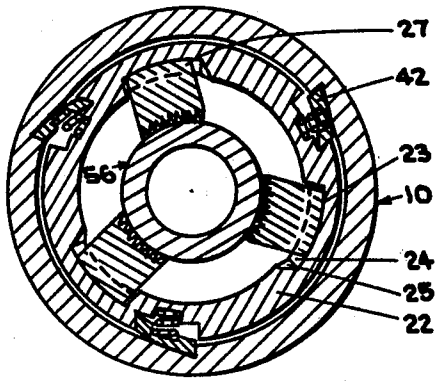


FIG 6

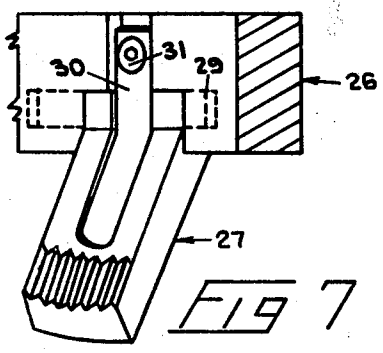


FIG 7

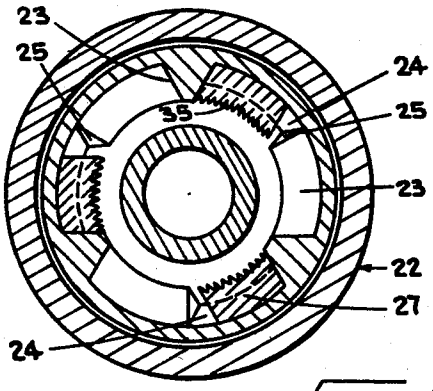


FIG 9

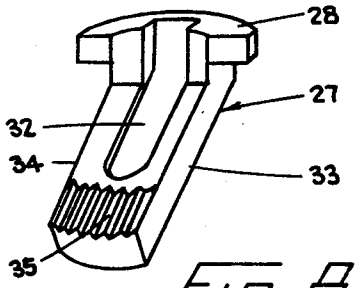


FIG 8

DERREL D. WEBB
INVENTOR.

BY Almon D. Nelson.
ATTORNEY

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WASHOVER TOOL, PIPE CUTTER AND RETRIEVER

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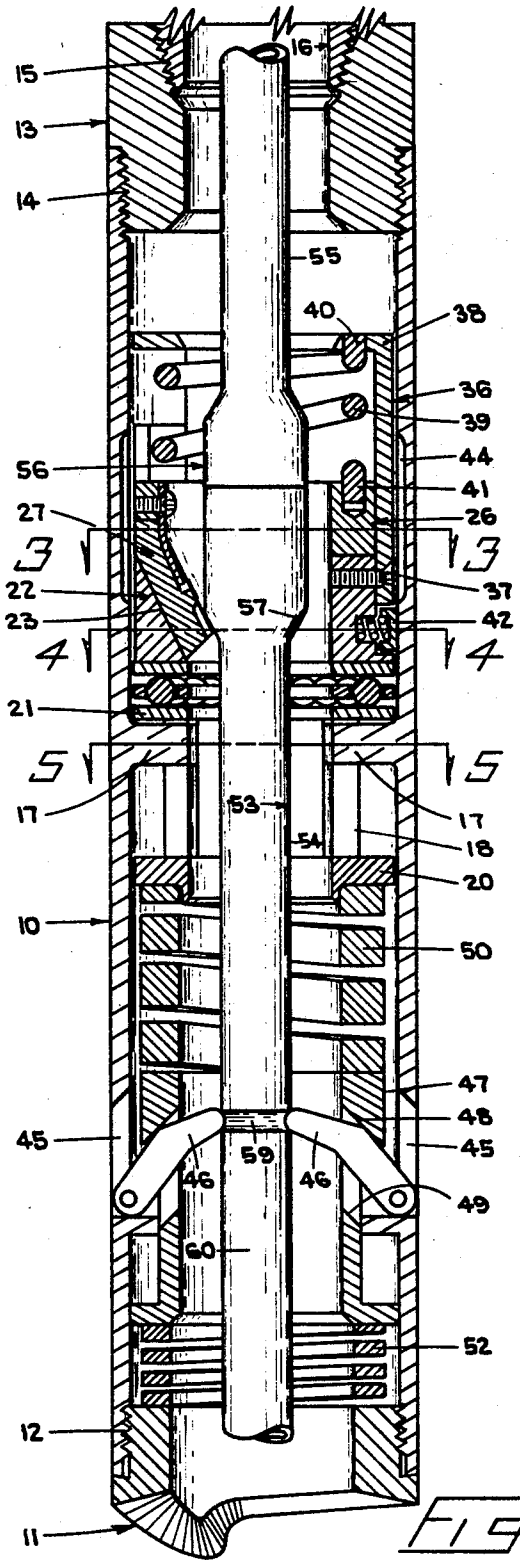


FIG 2

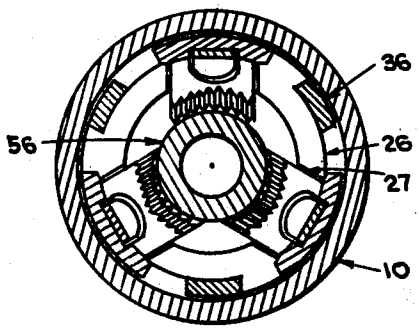


FIG 3

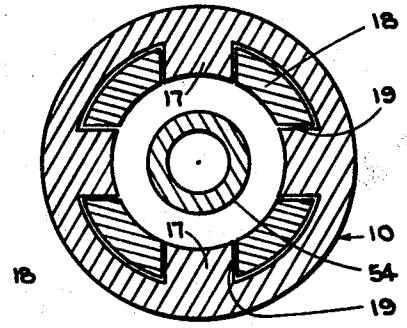


FIG 5

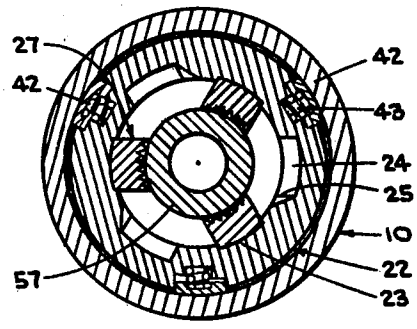


FIG 4

DERREL D. WEBB
INVENTOR.

BY Robert L. Nelson
ATTORNEY

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WASHOVER TOOL, PIPE CUTTER AND RETRIEVER

Derrel D. Webb, Houston, Tex., assignor to Houston Engineering, Inc., Houston, Tex., a corporation of Texas

Continuation of application Ser. No. 519,889, Jan. 11, 1966. This application Oct. 23, 1967, Ser. No. 680,610
9 Claims. (Cl. 166—55.6)

ABSTRACT OF THE DISCLOSURE

A washover tool, pipe cutter and retriever designed particularly to be used with pipe or tubing having smooth, tapered joints, and being further characterized by its ability to selectively retrieve or cut the pipe, or release the tool from the joint, as working conditions dictate.

Reference to related application

The present application is a continuation of my earlier filed application, Ser. No. 519,889, filed Jan. 11, 1966, now abandoned entitled "Washover Tool, Pipe Cutter and Retriever."

Background

The invention disclosed herein is an improvement over the invention disclosed and claimed in my prior Patent No. 3,174,548 dated Mar. 23, 1965. As in the above patent, this invention relates to well working operations and more particularly to a washover tool, pipe cutter and retriever which may be utilized for freeing or recovering at least a portion of a pipe or tubing which has become lodged in a well and is specifically designed to be utilized with pipe or tubing in which the joint between sections of such pipe or tubing merges into the pipe in a smooth taper, rather than in the form of a more or less square shoulder as disclosed in the above patent.

Heretofore it has been common practice, when a tubing or pipe has become lodged in a well, to attempt to free the same by the use of a washover tool which essentially comprises an annular cutter located at the lower end of a tubular body member which is attached to a washover pipe and is lowered into the well over the pipe or tubing which has become lodged therein. Upon lowering the washover tool to a point where the pipe or tubing has become lodged, rotation of a washover pipe and annular cutter will operate to cut away the rock or other debris which may be operating to grip the pipe or tubing and hold the same against movement thereby freeing the pipe or tubing to permit retrieving thereof for further working operations. Frequently, these prior art washover tools include means for engaging the pipe or tubing or a collar thereon to permit raising of the same from the well by raising the washover pipe, but frequently the washover operation is not sufficient to free the lodged pipe or tubing and it then becomes necessary to cut the same in order that the upper free portion thereof may be removed from the well.

Attempts have been made to provide a washover tool, pipe cutter and retriever, but difficulty has been experienced in providing such a tool within the dimensional limitations encountered in well drilling operations and also a tool which may be conveniently operated from the surface to perform the various operations and, furthermore, such prior art tools have been relatively complex and costly and also subject to frequent damage or breaking, thereby necessitating costly repairs and also delaying well working operations which materially increases the cost of such operations.

Also, where it has been attempted to combine pipe cutting and retrieving functions in a washover tool, this

has materially interfered with the normal use of the tool for washover operations which must be performed by rotation, upward and downward motion of the tool, as well as the free flow of fluid into and out of the well. Furthermore, many of these prior art tools required a relatively complex mode of operation in order to perform the various functions of the tool and such mode of operation was quite foreign to the normal washover operation.

While the combined washover tool, pipe cutter and retriever disclosed and claimed in the above-identified patent was perfeectly satisfactory for performing the intended operation in connection with a pipe or tubing having joints between the sections of the tubing which merge into the tubing in the form of a square shoulder, nevertheless, such tool is not practical for use in connection with pipe or tubing in which the joint between the sections thereof merges into the pipe or tubing in a smooth taper and, therefore, the present invention has been developed to provide a tool which will effectively operate with pipe or tubing having this type of joint.

It is accordingly an object of the invention to provide a washover tool, pipe cutter and retriever which may be attached to a washover pipe and in which all operations are consistent with the normal washover operation, or in other words, the tool of this invention may be operated to perform all of the functions thereof merely by rotation of the washover pipe string in one direction and by upward or downward movement of such pipe string.

A further object of the invention is the provision of a washover tool, pipe cutter and retriever which includes means for performing a normal washover operation, together with means for engaging a tapered enlargement or joint on the pipe or tubing which has become lodged in the well in order that an upward force may be exerted through the washover tool to raise the pipe from the well.

A still further object of the invention is the provision of a washover tool, pipe cutter and retriever, including means for engaging a tapered joint or other enlargement on a pipe to be removed from a well and in which, by an appropriate operation, such engaging means may be disengaged in order to permit movement of the tool upwardly over the tapered joint or other enlargement.

Another object of the invention is the provision of a washover tool, pipe cutter and retriever incorporating cutting means which may be engaged and disengaged with a pipe to be cut by upward and downward movement of the tool with relation to such pipe and in which the cutters are urged toward the pipe to be cut by spring means thereby precluding damage to the cutters due to excessive forces exerted thereon.

A further object of the invention is the provision of a washover tool, pipe cutter and retriever in which the cutters, when in operative position, are received in recesses which serve to protect the same against inadvertent damage.

A still further object of the invention is the provision of a washover tool, pipe cutter and retriever in which all operations of the tool requiring rotation may take place in one direction thereby precluding inadvertent unthreading of pipe sections.

Another object of the invention is the provision of a washover tool, pipe cutter and retriever in which the operation of the cutters is controlled solely by up and down movement of the tool with respect to the pipe to be cut.

A further object of the invention is the provision of a washover tool, pipe cutter and retriever in which rotation of the tool to operate the cutters in no way interferes with the engagement of the retriever dogs with a tapered joint or enlargement on the pipe to be cut and retrieved.

A still further object of the invention is the provision of a washover tool, pipe cutter and retriever which may

be conveniently manufactured from readily available material which is relatively simple in construction and which by reason of the specific design thereof is not subject to frequent damage or breakage.

Further objects and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawings wherein:

FIG. 1 is a fragmentary longitudinal sectional view showing the upper portion of the tool of this invention with parts thereof in the position occupied during lowering of the tool downwardly over a tapered joint in the pipe or tubing to be engaged by the tool;

FIG. 2 is a longitudinal sectional view showing the entire tool of this invention in the position occupied during engagement with the joint of the pipe or tubing and also during engagement of the cutters therewith;

FIG. 3 is a sectional view taken substantially on the line 3—3 of FIG. 2;

FIG. 4 is a sectional view taken substantially on the line 4—4 of FIG. 2;

FIG. 5 is a sectional view taken substantially on the line 5—5 of FIG. 2;

FIG. 6 is a sectional view taken substantially on the line 6—6 of FIG. 1;

FIG. 7 is a fragmentary view in perspective showing the manner in which a joint engaging dog is mounted in the dog cage;

FIG. 8 is a view in perspective showing the joint engaging dog; and

FIG. 9 is a sectional view showing the joint engaging dogs in released position to permit removal of the tool from the well without removing the pipe or tubing lodged therein.

With continued reference to the drawings and more particularly FIGS. 1 and 2, there is shown a washover tool, pipe cutter and retriever constructed in accordance with this invention and which may well comprise an elongated tubular body **10** having an annular cutter **11** removably secured by screw threaded means or the like **12** to the lower end of the tubular body **10**. A suitable coupling member **13** may be removably secured by screw threads or the like **14** to the upper end of the tubular body **10** and the coupling member serves to removably attach the tool of this invention by screw threads or the like **15** to the lower end of a washover pipe string **16**.

The tubular body **10** is provided intermediate the length thereof with a plurality of circumferentially spaced, inwardly extending lugs **17** and a sleeve **18** is slidably disposed in the body **10** with the sleeve **18** having slots **19** therein slidably receiving the lugs **17**. The lower ends of the slots **19** are closed by a suitable member **20** to provide an abutment for engaging the lower sides of the lugs **17** in one position of the sleeve **18** and such engagement serves to limit upward movement of the sleeve **18**. A thrust bearing **21** is disposed within the body **10** above the lugs **17** and the purpose of such thrust bearing will be later described.

A cam bowl **22** is disposed within the body **10** in engagement with the upper side of the thrust bearing **21** and as best shown in FIGS. 4, 6 and 9, the cam bowl **22** is provided with a plurality of circumferentially spaced downwardly and inwardly extending wedge surfaces **23** and a plurality of inwardly opening recesses **24** with one recess disposed between each pair of adjacent wedge surfaces **23**. A cam surface **25** connects each wedge surface **23** and the adjacent recess **24** as clearly shown in FIG. 9. The operation of the cam bowl **22** will be later described.

A dog cage **26** is disposed above the cam bowl **22**, and as best shown in FIGS. 1, 2, 7 and 8, the dog cage **26** carries a plurality of circumferentially spaced pipe joint engaging dogs **27** and the dogs **27** project downwardly interiorly of the cam bowl **22**. As best shown in FIGS. 7 and 8, each dog **27** is generally T-shaped with the head **28** thereof loosely received in an inwardly opening recess **29** in the dog cage **26** and each dog **27** is yieldably held in position by a leaf spring **30** secured at the upper end by screw threaded fastening means or the like **31** to the dog cage **26** and extending downwardly within a groove **32** in the inner surface of each dog **27** to yieldably retain the same in engagement with the inner surface of the cam bowl **22**. The outer surface **33** of the shank portion **34** of each dog **27** is of substantially the same configuration as the wedge surface **23** on the cam bowl **22** and serves to engage this wedge surface **23** for sliding movement thereon. The lower inner surface of the shank portion **34** of each dog **27** is provided with teeth or serrations **35** for engaging a pipe joint in a manner to be later described.

A tubular retainer cage **36** is disposed in the tubular body **10** and is secured at the lower end thereof by screw threaded fastening means or the like **37** to the cam bowl **22**. The retainer cage **36** extends upwardly around the dog cage **26** and terminates in an inwardly extending flange **38** disposed above and in spaced relation to the upper edge of the dog cage **26**. A coil spring **39** is housed in the retainer cage **36** and the upper end **40** of the spring **39** is fixed to the flange **38** on the upper end of the retainer cage **36** and the lower end **41** of the spring **39** is fixed to the dog cage **26**. The spring **39** is rotatably positioned within the retainer cage **36** so as to bias the dog cage **26** and dogs **27** carried thereby downwardly with respect to the cam bowl **22**, so that the dogs yieldingly engage the wedge surfaces **23** thereof.

As best shown in FIGS. 4 and 6 a plurality of circumferentially spaced pawls **42** are pivotally mounted on the dog cage **22** and project radially outwardly therefrom. Compression spring means **43** are provided for urging the pawls **42** outwardly. The tubular body **10** is provided with a plurality of circumferentially spaced longitudinally extending inwardly opening ratchet grooves **44**, and as clearly shown in FIGS. 1 and 2, the grooves extend upwardly from a point spaced upwardly from the lugs **17**. The pawls **42** serve to engage in the grooves **44** to prevent relative rotation between the dog cage **22** and the body **10** in one position of these members, and to permit such relative rotation in a second respective position of these members. The specific purpose of the pawls **42** and grooves will be later described in connection with a description of the operation of the tool of this invention.

A plurality of circumferentially spaced cutter receiving recesses **45** are provided in the wall of the tubular body **10** below the lugs **17** and a cutter **46** is pivotally mounted in each recess **45** for movement inwardly into engagement with a pipe to be cut and for movement outwardly into the recesses **45**. A cutter actuating sleeve **47** is slidably received in the body **10** and the actuating sleeve **47** is provided with cam surfaces **48** for engaging the upper surfaces of the cutters **46** to urge the same inwardly out of the recesses **45** and the actuating sleeve **47** is also provided with cam surfaces **49** for engaging the lower surfaces of the cutters **46** to urge the same outwardly into the recesses **45**. A compression spring **50** is disposed within the body **10**, with the upper end of the spring **50** engaging the lower end **20** of the sleeve **18** and the lower end of the spring **50** engaging the upper end of the cutter actuating sleeve **47**.

A second compression spring **52** is received in the body **10**, with the upper end of the spring **52** engaging the lower end of the cutter actuating sleeve **47** and with the lower end of the spring **52** engaging the upper end of the annular cutter **11** removably secured in the lower end of the body **10**.

The operation of the tool of this invention will now be described with particular reference to FIGS. 1 and 2. The pipe or tubing to be removed from a well is shown at **53** in FIGS. 1 and 2 and, for purposes of illustration, there is shown a lower section **54** and an upper section **55** connected by a suitable joint **56** and the joint **56** merges into the lower section **54** with a smooth tapered surface **57**. Prior to lowering the tool of this invention into the well

to remove the pipe or tubing **53** or a section thereof, the compression springs **50** and **52** serve to urge the sleeve **47**, the sleeve **18**, the thrust bearing **21**, the cam bowl **22** and the dog cage **26** upwardly. In such position of the cutter actuating sleeve **47**, the cutters **46** are moved outwardly into the cutter receiving recesses **45** in the body **10**.

The tool is then lowered into the well over the tubing or pipe string **53** and, upon reaching the joint **56**, the lower ends of the dogs **27** will engage the upper tapered surface **58** of the joint **56** in the pipe or tubing **53** and this engagement, when the tool is continued to be moved downwardly, will serve to move the dogs **27** together with the dog cage **26** still further upwardly against the force of the spring **39** to the position shown in FIG. 1, at which time the dogs **27** may pass downwardly over the joint **56**.

Upon reaching a position below the joint **56**, the spring **39** will move the dog cage **26** and dogs **27** carried thereby downwardly along the wedge surfaces **23** on the cam bowl **22** and this movement will result in projecting the lower ends of the dogs **27** inwardly to a position as shown in FIG. 2, with the teeth or serrations **35** on the dogs **27** engaging the lower tapered surface **57** on the joint **56**.

At this time, referring to FIG. 2, if it is desired to exert an upward pull on the tubing or pipe string **53** in an attempt to remove the same from the well, it is only necessary to exert an upward pull on the body **10**, which, by reason of the engagement of the dogs **27** with the joint **56**, will result in upward movement of the body **10**, the thrust bearing **21**, cam bowl **22** and dogs **27**. Any desired upward force may be exerted on the body **10** in an attempt to remove the tubing or pipe string **53** from the well.

In the event the pipe string cannot be removed from the well in this manner, it may be desired to cut the same below the joint **56** in order that the upper portion of the pipe string may be removed. This cutting operation will be accomplished with the dogs **27** in engagement with the lower tapered surface **57** of the joint **56** in order to prevent downward movement of the upper portion of the pipe string after completion of the cutting operation.

In order to accomplish this cutting operation, it is only necessary to rotate the body **10** which will result in rotating the cutters **46** around the tubing or pipe string **53** in order to make a cut **59** therein to sever the section of pipe **60** located below the cut **59**. During this cutting operation the upward force or pull on the body **10** is absorbed by the thrust bearing **21** and this permits free rotation of the body **10** in order to accomplish the cutting operations and without in any way tending to rotate the dogs **27** in engagement with the tapered surface **57** of the joint **56**. Upon completion of the cutting operation, the portion of the pipe or tubing thereabove may be conveniently lifted out of the well.

In some cases it is desired to remove the tool from the well without lifting the pipe or tubing **53** thereof and also without performing the cutting operation described above and, for this purpose, the tubular body **10** is moved longitudinally relative to the cam bowl **22**, so that the pawls **42** are disposed opposite the ratchet grooves **44**. When in such position, the body **10** is rotated clockwise as viewed in FIG. 6, and this will result in rotating the cam bowl **22** in a clockwise direction by reason of the engagement of the pawls **42** in the grooves **44**. Since the dogs **27** are held stationary by reason of the engagement thereof with the joint **56**, such rotation of the cam bowl **42** will result in moving the dogs **27** from engagement with the wedge surfaces **23** down the cam surfaces **25** and into the recesses **24**. Movement of the dogs **27** into the recesses **24** results in disengaging the same from the tapered surface **57** of the joint **56** and thereafter the tool may be lifted upwardly out of the well leaving the tubing or pipe string **53** therein.

After removal of the tool from an enlarged joint, such as joint **56**, the spring **39** will operate to rotate the dog cage **26** and dogs **27** carried thereby in a clockwise direction as viewed in FIG. 4 in order to move the dogs **27** up the cam surfaces **25** and into engagement with the wedge surfaces **23** which operates to place the tool in condition for another operation as described above.

It is to be noted that rotation of the cam bowl **22** is prevented during the cutting operation described above, by reason of the fact that, as clearly shown in FIG. 2, during this cutting operation, the pawls **42** are disposed below the lower ends of the grooves **44** and, therefore, in this position the pawls **42** cannot operate to rotate the cam bowl **22**.

It will be seen that by the above described invention there has been provided a relatively simple washover tool, pipe cutter and retriever which by reason of the particular design and construction thereof may be utilized to engage and retrieve a tubing or pipe string from a well. Alternately, if desired, such pipe string can be cut to remove a section thereof, or, as a still further alternative, the tool may be engaged with a joint on a pipe string and thereafter disengaged therefrom without removing the pipe string from the well. The tool of this invention is particularly designed to facilitate engagement thereof with the tapered surface of a joint between pipe sections. It is further to be noted that the tool of this invention, as described above, efficiently performs all the desired and intended operations merely by raising or lowering the tool or by rotating the same in one direction thereby providing a tool which is completely compatible with all normal washover operations.

It will be obvious to those skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof and, therefore, the invention is not limited by that which is shown in the drawings and described in the specification, but only as indicated in the appended claims.

What is claimed is:

1. A washover tool, pipe cutter and retriever comprising a tubular body, an annular cutter removably secured to the lower end of said body, a coupling member removably secured to the upper end of said body for connecting said tool to a washover pipe string, a plurality of circumferentially spaced inwardly extending lugs intermediate the length of said body, a sleeve disposed in said body and having slots slidably receiving said lugs, the lower ends of said slots being closed to provide abutments for engaging said lugs to limit upward movement of said sleeve, a thrust bearing disposed in said sleeve above said lugs, a cam bowl fixed to said sleeve and engaging the upper side of said thrust bearings, said cam bowl having a plurality of circumferentially spaced downwardly and inwardly extending wedge surfaces, and an inwardly opening recess between each pair of wedge surfaces, a cam surface connecting each wedge surface and the adjacent recess, a dog cage disposed above said cam bowl, a plurality of pipe joint engaging dogs carried by said cage and projecting downwardly into said bowl, there being one dog for each wedge surface, a tubular retainer cage surrounding said dog cage and secured to said cam bowl, said retainer cage projecting above said dog cage, a coil spring disposed in said retainer cage, the upper end of said spring being fixed to the upper end of said retainer cage and the lower end being fixed to said dog cage, said spring tending to rotate said dog cage and dogs in a direction to yieldably retain said dogs in engagement with said wedge surfaces and tending to urge said dog cage and dogs downwardly with respect to said cam bowl, a pawl pivotally mounted on said dog cage, longitudinally extending circumferentially spaced ratchet grooves in the inner surface of said body, said grooves extending upwardly from the point spaced upwardly from said lugs, spring means for urging said pawl into engagement with said grooves to prevent relative rotation between said dog cage and said body in one position of these members, and to permit such relative rotation in a second respective position of these members, circumferentially spaced cutter receiving recesses in said body below said lugs, a cutter

pivotally mounted in each of said last-named recesses for movement inwardly into engagement with a pipe to be cut and for movement outwardly into said last-named recesses, a cutter actuating sleeve slidably mounted in said body, inter-engaging means on said actuating sleeve and said cutters to move said cutters into and out of said last-named recesses upon movement of said actuating sleeve, a compression spring disposed between the lower end of said first mentioned sleeve and the upper end of said actuating sleeve to urge said actuating sleeve downwardly and move said cutters inwardly into engagement with a pipe to be cut, and a second compression spring fixed in the lower end of said body and engaging the lower end of said actuating sleeve to urge said actuating sleeve upwardly to move said cutters outwardly into said cutter receiving recesses.

2. A washover tool, pipe cutter and retriever comprising a tubular body, an annular cutter removably secured to the lower end of said body, a coupling member removably secured to the upper end of said body for connecting said tool to a washover pipe string, a plurality of circumferentially spaced inwardly extending lugs intermediate the length of said body, a sleeve disposed in said body and having slots slidably receiving said lugs, the lower ends of said slots being closed to provide abutments for engaging said lugs to limit upward movement of said sleeve, a thrust bearing disposed in said sleeve above said lugs, a cam bowl fixed to said sleeve and engaging the upper side of said thrust bearing, said cam bowl having a plurality of circumferentially spaced downwardly and inwardly extending wedge surfaces, and an inwardly opening recess between each pair of wedge surfaces, a cam surface connecting each wedge surface and the adjacent recess, a dog cage disposed above said cam bowl, a plurality of pipe joint engaging dogs carried by said cage and projecting downwardly into said bowl, there being one dog for each wedge surface, a tubular retainer cage surrounding said dog cage and secured to said cam bowl, said retainer cage projecting above said dog cage, means tending to rotate said dog cage and dogs in a direction to yieldably retain said dogs in engagement with said wedge surfaces and to urge said dog cage and dogs downwardly with respect to said cam bowl, a pawl pivotally mounted on said dog cage, longitudinally extending circumferentially spaced ratchet grooves in the inner surface of said body, said grooves extending upwardly from a point spaced upwardly from said lugs, spring means for urging said pawl into engagement with said grooves to prevent relative rotation between said dog cage and said body in one position of these members and to permit such relative rotation in a second respective position of these members, circumferentially spaced cutter receiving recesses in said body below said lugs, a cutter pivotally mounted in each of said last-named recesses for movement inwardly into engagement with a pipe to be cut and for movement outwardly into said last-named recesses, a cutter actuating sleeve slidably mounted in said body, inter-engaging means on said actuating sleeve and said cutters to move said cutters into and out of said last-named recesses upon movement of said actuating sleeve, a compression spring disposed between the lower end of said first mentioned sleeve and the upper end of said actuatig sleeve to urge said actuating sleeve downwardly and move said cutters inwardly into engagement with a pipe to be cut, and a second compression spring fixed in the lower end of said body and engaging the lower end of said actuating sleeve to urge said actuating sleeve upwardly to move said cutters outwardly into said cutter receiving recesses.

3. A washover tool, pipe cutter and retriever comprising a tubular body, an annular cutter removably secured to the lower end of said body, a coupling member removably secured to the upper end of said body for connecting said tool to a washover pipe string, a plurality of circumferentially spaced inwardly extending lugs intermediate the length of said body, a sleeve disposed in said body and having slots slidably receiving said lugs, an abutment on said sleeve for engaging said lugs to limit upward movement of said sleeve, a thrust bearing disposed in said sleeve above said lugs, a cam bowl fixed to said sleeve and engaging the upper side of said thrust bearing, said cam bowl having a plurality of circumferentially spaced downwardly and inwardly extending wedge surfaces, and an inwardly opening recess between each pair of wedge surfaces, a cam surface connecting each wedge surface and the adjacent recess, a dog cage disposed above said cam bowl, a plurality of pipe joint engaging dogs carried by said cage and projecting downwardly into said bowl, there being one dog for each wedge surface, a tubular retainer cage surrounding said dog cage and secured to said cam bowl, said retainer cage projecting above said dog cage, means in said retainer cage tending to rotate said dog cage and dogs in a direction to yieldably retain said dogs in engagement with said wedge surfaces and to urge said dog cage and dog downwardly with respect to said cam bowl, means to prevent relative rotation between said dog cage and said body in one position of these members and to permit such relative rotation in a second respective position of these members, circumferentially spaced cutter receiving recesses in said body below said lugs, a cutter pivotally mounted in each of said last-named recesses for movement inwardly into engagement with a pipe to be cut and for movement outwardly into said last-named recesses, a cutter actuating sleeve slidably mounted in said body, inter-engaging means on said actuating sleeve and said cutters to move said cutters into and out of said last-named recesses upon movement of said actuating sleeve, a compression spring disposed between the lower ends of said first mentioned sleeve and the upper end of said actuating sleeve to urge said actuating sleeve downwardly and move said cutters inwardly into engagement with a pipe to be cut, and a second compression spring fixed in the lower end of said body and engaging the lower end of said actuating sleeve to urge said actuating sleeve upwardly to move said cutters outwardly into said cutter receiving recesses.

4. A pipe retrieving tool comprising a tubular body, a cam bowl, means supporting said cam bowl within said body for vertical movement relative thereto, said cam bowl being formed internally with a plurality of alternately spaced wedge surfaces and recesses, a dog cage disposed within said body above said cam bowl, a plurality of pipe joint engaging dogs carried by said cage and projecting inwardly and downwardly into said cam bowl, spring means biasing said cage and said dogs downwardly so that said dogs when in normal repose are in resilient engagement with said wedge surfaces and as a result extend substantially radially inwardly to the interior of said cam bowl, said dogs, when said tool is lowered over said pipe, engaging the upper shoulder of said pipe joint and being forced upwardly and radially outwardly along said wedge surfaces against the bias of said spring means thereby permitting said tool to pass said joint, said spring means biasing said dogs downwardly and inwardly after the tool has passed over the joint for engagement of said dogs with the lower shoulder of said joint thereby conditioning said tool for removal of said pipe responsive to upward movement of said body and said cam bowl, and means operatively interconnecting said cam bowl and said body for preventing rotation of said body relative to said bowl in a first position of these members but permitting such relative rotation in a second respective position of these members, the rotation of said body, when said cam bowl and said body are in such first position, rotating said cam bowl to align said dogs with said recesses, with movement of said dogs into said recesses releasing said dogs from engagement with said joint thereby permitting said tool to be moved upwardly relative to said joint.

5. The tool of claim 4 further including a plurality of cutters pivotally carried by said body and movable

in recesses therein, means within said body for biasing the free ends of said cutters into engagement with said pipe responsive to predetermined longitudinal movement of said body relative to said cam bowl to position such members in said second position, subsequent rotation of said body rotating said cutters while said dogs are held from rotation by said pipe.

6. The tool of claim 5 further including a cutter actuating sleeve slidably mounted in said body, said actuating sleeve being formed with recesses which define cam surfaces for moving said cutter toward or away from said pipe, first compression spring means positioned at one end of said actuating sleeve for biasing said cutter actuating sleeve so as to urge said cutters toward said pipe, and second compression spring means positioned at the opposite end of said actuating sleeve for biasing said actuating sleeve so as to urge said cutters away from said pipe into said recesses formed in said body.

7. The tool of claim 4 wherein said cage biasing spring means is fixed at one end to a retainer cage carried by said cam bowl and telescopically disposed around said dog cage, the opposite end of said spring operatively engaging said dog cage, said spring means being under compression and urging said dog cage and said dogs downwardly into resilient engagement with said wedge surfaces.

8. The tool of claim 4 wherein said means operatively interconnecting said cam bowl and said body comprises a plurality of pawls pivotally mounted on said dog cage, longitudinally extending, circumferentially spaced ratchet grooves formed in the inner surface of said body, and pawl spring means associated with each of said pawls for urging the same into said grooves when the latter are longitudinally positioned radially outwardly of said pawls thereby preventing rotation of said body relative to said cam bowl.

9. The tool of claim 8 wherein the bottom of each of said grooves is curved to form a cam surface down which said pawls can move against the bias of said pawl springs when said body is moved longitudinally relative to said cam bowl, the longitudinal disalignment of said pawls and said grooves permitting rotation of said body relative to said cam bowl.

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JAMES A. LEPPINK, *Primary Examiner.*

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,396,794 August 13, 1968

Derrel D. Webb

It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

In the heading to the printed specification, lines 4 and 5, "Houston Engineering, Inc.," should read -- Houston Engineers, Inc., --.

Signed and sealed this 17th day of March 1970.

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents