The present invention relates to an improvement in overshots of the grapple type.

In the drilling of oil and gas wells, it frequently becomes necessary to remove objects which become stuck or which are dropped in the well bore, for example, pipe and other objects commonly referred to in the trade as "fish." The present invention is directed to an improved overshoot of the grapple type which may be lowered into a well bore on an operating string of pipe and there manipulated in the well bore to grip the fish in order that it may be removed with the overshoot from the well bore. The present invention is also directed to such an overshoot through which circulation may effectively be accomplished and one which may be released from the fish if it is not possible to dislodge the fish from the well bore. It is therefore an object of the present invention to provide an improved grapple type overshoot for lowering into a well bore and gripping stick objects therein for removing them from the well bore.

Still a further object of the present invention is the provision of such an overshoot of the spiral basket type which is relatively simple and inexpensive to manufacture and maintain and which is efficiently rugged in use. Still a further object of the present invention is the provision of a spiral type basket grapple overshoot which utilizes eccentric elements to prevent rotation of the grapple within the spiral bowl receiving it so that the stick object may effectively be gripped and torque applied thereto in an effort to release it from the well bore.

Other and further objects, features and advantages of the invention will be apparent from the following description of a presently preferred embodiment thereof, given for the purpose of disclosure, and taken in conjunction with the accompanying drawings, where like reference characters designate like parts throughout the several views, and where

Figure 1 is an elevational view illustrating an overshoot according to the invention as it is lowered into a well bore to be washed over a fish and to grip it for retrieving it from the well bore.

Figure 2 is a fragmentary view of the overshoot of Figure 1, in sectional elevation, illustrating the slips in retracted position.

Figure 3 is a view similar to that of Figure 2 illustrating the slips frictionally engaging a fish.

Figure 4 is a cross-sectional view taken along the line 4—4 of Figure 3.

Figure 5 is a cross-sectional view taken along the line 5—5 of Figure 2, and

Figure 6 is a cross-sectional view taken along the line 6—6 of Figure 2.

Referring to the drawings, and particularly to Figure 1, the overshoot is generally indicated by the reference numeral 10 and illustrated as being lowered into the well bore 12 by an operating string of pipe 14 extending to the surface, not shown, to free and release the fish 16, here shown as a section of pipe, from the well bore 12 where it is stuck in the well bore by the formation 18 securely gripping it.

As best illustrated in Figure 1, the lower end 20 of the overshoot comprises a guide of an internal diameter sufficient so that it may be washed or telescoped over the pipe 16 which previously has been freed from the formation 18 by a washing over operation in the usual manner.

Referring now to Figure 2, the grapple 10 includes a generally tubular body 22 which is threadedly connected to the guide 20 at its lower end. The inner upper portion of the body 22 is in the shape of a spiral or helix 25 to form a helical bowl 24 to receive the grapple 26 which has a complementary helical outside surface 27 so that the grapple may be screwed easily into the bowl 24.

At the upper end of the bowl 24 there is provided an annular stop member 28 which is welded or otherwise secured to the body 22 for the purpose of limiting upward movement of the grapple 26.

It is noted that the inner spiral surface 25 of the bowl is downwardly and inwardly tapered as is the coaxing outer surface 27 of the grapple 26 so that as the grapple is moved upwardly relative to the bowl 24 it is in retracted position and when it is moved downwardly relative to the bowl 24 it is compressed inwardly to frictionally grip the fish.

A plurality of slots 30 extend in an axial direction substantially along the length of the grapple 26 and are provided so that the grapple 26 is yieldingly held in the upward position shown in Figure 2 but may be compressed inwardly to frictionally engage the pipe 16 as previously mentioned.

Disposed in the outer surface of the lower end 32 of the grapple 26 is the slot 34 which receives the key 36 to prevent rotation of the grapple 26 relative to the body 22 as presently described.

An annular control assembly 38 is disposed within the lower portion of the body 22 and includes a pair of eccentric shoulders 40 and 42 disposed on its outer surface which coax with the eccentric grooves 44 and 46, respectively, in the body 22 which prevents rotation of the guide assembly 38 relative to the body 22.

A downwardly facing shoulder 48 is provided on the guide assembly 38 which engages the upper end 50 of the rotary shoe 20 to support the guide assembly 38 in position.

The lower end of the key 36 is integral with the control assembly 38 so that the control assembly 38 and grapple 26 are keyed together thus preventing rotation of the grapple 26 in the bowl 24 after it has been assembled therein by screwing it in place. Of course, the control assembly 38 and the grapple 26 may be keyed together in any desired manner.

In order to provide circulation down through the fish after it has been gripped by the grapple 26, an annular sealing ring 54 is provided which extends inwardly from the guide assembly 38 and which sealingly engages the fish 16, as best illustrated in Figure 3. Thus, if the fish 16 is not completely free, circulation can be forced down through the fish 16 in an effort to assist in freeing it.

It is noted that advantageously the control assembly 38 is an integral or one piece unit including the key 36, the eccentric shoulders 40 and 42, the mill 39 and the packing 54.

In order that the grapple 26 may be released from the fish 16 in the event it is not possible to dislodge the fish from the well bore, the teeth 56 are cut on a spiral, that is a thread, so that by rotating the overshoot with a slight upward strain the grapple may be unthreaded from the fish 16.

The present overshoot is very easily assembled. The annular ring 28 is welded in place as illustrated. The basket 26 is then screwed into place quickly, the control
assembly 38 is placed in position with the key 36 in the slot 34 of the grapple 26 and a member, here shown as the guide 20, threaded into place. The overshot is then ready for use, the eccentric, previously described, preventing rotation of the control assembly 38 which, in turn, prevents rotation of the grapple 26. The slots 30 cut in the grapple 26 maintain the grapple in a retracted position, which is the upward position shown in Figure 2, until a fish is contacted with the teeth 56 and an upward pull is applied to the body 22.

In use, and referring again to Figure 1, the overshot is assembled as previously described and secured to the operating string of pipe 14 extending to the surface of the ground. The overshot is lowered into the well bore 12 and is telescoped over the upper end of the stuck pipe 16. After the overshot has telescoped over the upper end of the fish 16 so that it extends into the pool, for example as illustrated in Figure 3, an upward strain or force is applied to the operating string 14 at the surface which causes the body 22 to move upwardly relative to the grapple 26, the fish 16 being frictionally contacted by the teeth 56 of the grapple 26 thereby preventing the grapple 26 from moving upwardly. This causes the fish 16 to be gripped by the grapple 26 as illustrated in Figure 3. If the pipe 16 is free, the overshot is simply removed from the well bore 12 with the stuck pipe or fish 16.

If the overshot is to be removed from the well bore, a force can be exerted on the operating string of pipe 14 to apply torque to the stuck fish 16, fluid can be circulated down through the fish 16 in an effort to free it or other steps may be taken to free the fish 16 or a portion thereof.

In the event it is not possible to remove the fish 16, the force applied to the overshot is slackened off so that there is a slight upward strain, at which time the overshot 22 is threaded off the fish 16 due to the thread face form of the teeth 56.

Once the overshot is released, the overshot may be removed from the well bore and other means utilized in an attempt to free the stuck pipe 16.

If there is any difficulty in telescoping over the fish 16, the tool may be rotated and the mill 39 will mill off any projections on the fish 16 so that the fish 16 can be worked into the grapple 26.

It will be understood, of course, that the grapple-type overshot of the present invention may be interposed at any place in the operating string so that any desired amount of stuck pipe may be washed over before it is gripped in an effort to retrieve it from the well bore as described.

It is noted that the overshot of the present invention is very easily manufactured, the entire metal work being performed on a single lathe; whereas, other grapple-type overshots require different machining by different machining assemblies.

The present invention, therefore, is well suited and adapted to carry out the objects and attain the ends and advantages mentioned as well as others inherent therein.

While only a presently preferred embodiment of the invention has been given for the purpose of disclosure, changes in details of construction and arrangement of parts will readily suggest themselves to those skilled in the art which are encompassed within the spirit of the invention as defined by the scope of the appended claims.

What is claimed is:

1. The improvement in a grapple overshot adapted to telescope over an object to be withdrawn from a well and having a tubular body connected to an operating string of pipe, a tubular expansible grapple in the body, said body and grapple having complementary coacting inwardly and downwardly tapered guide and slide surfaces, respectively, so that downward movement of the grapple relative to the body urges the grapple inwardly to grip the object comprising, a generally tubular control assembly secured in the body, at least one coating eccentric disposed on the control assembly and in the body preventing rotation of the control assembly relative to the body, and a key connecting the grapple to the control assembly thereby preventing rotation of the grapple relative to the body.

2. In a grapple type overshot having a generally tubular body, a tubular expansible grapple in the body, said body and grapple having complementary coacting inwardly and downwardly tapered guide and slide surfaces, the improvement in a control assembly comprising, a generally annular control assembly secured in the body, two eccentric shoulders disposed on the exterior of the control assembly, said body having eccentric grooves coacting with said shoulders thereby preventing rotation of the control assembly relative to the body, and connecting means connecting the grapple to the control assembly permitting rotation of the grapple relative to the body.

3. An overshot adapted to telescope over an object to be removed from a well bore comprising, a generally tubular body arranged to be connected to an operating string, a downwardly and inwardly tapering spiralled seat disposed in the body, a tubular grapple having a complementary spiralled and downwardly and inwardly tapered outer surface slidably disposed in the seat, said grapple having slots extending in an axial direction along the substantial portion of its length permitting radial inward movement of the grapple upon downward movement of the grapple relative to the seat, a control assembly disposed in the body below the seat, a pair of diametrically oppositely-disposed eccentric shoulders on the outer surface of the control assembly and a pair of coacting eccentric surfaces in the body preventing rotation of the control assembly relative to the body, a slot in the lower portion of the grapple, and a key extending upwardly from the control member and disposed in the slot keying the grapple and the guide assembly together thereby preventing rotation of the grapple relative to the body.

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