This invention relates to well tubing anchoring devices, and in particular a plurality of slips pivotally mounted on the end of a sleeve with the slips actuated by a mandrel and with the sleeve on which the slips are mounted retained in the set position against the string with latching dogs.

The object of this invention is, therefore, to provide means for forming a tubing anchor whereby pivotally mounted slips are pivotally mounted on a mandrel and sleeves and gripping latches in combination. With a spring for controlling the movement of the sleeve on the mandrel.

Another object of the invention is to provide a well or tubing anchor that is adapted to be used in combination with tubing or well casings now in use.

A further object of the invention is to provide a toggle well or tubing anchor which is of a simple and economical construction.

With these and other objects and advantages in view the invention embodies a tubular mandrel having slots therein in a well casing or tubing with toggle levers providing slips pivotally mounted in the mandrel and positioned in said slots, a spring actuated sleeve on the end of which the toggle levers are pivotally mounted, latches adapted to retain the parts in assembled relation, and a latch jack for releasing the device.

Other features and advantages of the invention will appear from the following description taken in connection with the drawings, wherein:

Figure 1 is a vertical section through a tubular casing of a well illustrating the position of the anchor therein with the parts in the set positions.

Figure 2 is a similar view illustrating a latch jack positioned on the latching levers and also showing the parts in the set position.

Figure 3 also shows a view similar to that shown in Figure 1 illustrating the positions of the parts with the slips in the clamped position.

Figure 4 is a cross section taken on line 4—4 of Figure 1 showing the well casing with the gripping anchor therein.

Figure 5 is a similar sectional plan taken on line 5—5 of Figure 1 showing in particular, the latching levers.

Figure 6 is a detail showing the latch jack with parts omitted and with parts broken away.

Referring now to the drawings wherein like reference characters denote corresponding parts the tube anchor of this invention includes a mandrel 10, slips 11 pivotally mounted on pins 23 pivotally connecting upper toggle levers 12 and lower toggle levers 13, a sleeve 14 slidably mounted on the mandrel and urged toward the position of holding the slips in locking engagement with a well casing 15 by a spring 16, latches 17 for holding the sleeve with the spring compressed and the slips released and a latch jack 18 for actuating the latches to released positions.

The mandrel 10 is provided with elongated slots 19 and 20 through which re-setting shoulder 21 on the upper end of the sleeve 14 extend and, as illustrated in Figure 1 the latches 17 which are pivotally mounted on pins 22 extend through the lower ends of the slots with the lower surfaces of the latches positioned to substantially engage the beveled surfaces 23 in the lower ends of the slots.

One pair of the toggle levers is positioned in the upper end of the slot 19, as shown in Figure 1 with the upper lever 12 pivotally mounted by a pin 24 in the slot and with the lever 13 pivotally mounted by a pin 25 in a recess 26 in the upper end of the sleeve 14.

The mandrel 10 is also provided with slots 27 and 28 in which toggle levers, similar to the levers 12 and 13 are positioned and, as illustrated in the drawing slips 11 are pivotally mounted on the toggle levers with pins 29.

The mandrel 10 is also provided with an annular shoulder 30 upon which the lower end of the spring 16 is positioned, and it will be appreciated that in setting the device for positioning in anchoring in a well tube or casing the latches 17 hold the spring 16 compressed with the slips 11 in released position and with the anchor in a desired position in the well casing the latches 17 are actuated by a latch jack, such as the jack illustrated in Figure 6 whereby upward movement on the inner end of the latches fixes and then releases the spring so that the spring urges the sleeve 14 upwardly with the toggle levers forcing the slip into engagement with the inner sur-
face of the well casing, as illustrated in Figure 3. Upon upward movement of the mandrel the shoulder 30 compresses the spring 16 and the latches are dropped by gravity to the horizontally disposed position shown in Figures 1 and 2 whereby the slips are drawn away from the inner surface of the well casing.

As illustrated in Figure 6, the latch jack 18 is formed with a slot 31 that is positioned to receive the latches 17. Legs 32 and 33 at the sides of the slot 31 are provided with slots 34 and 35, respectively in which a latch 36 is positioned and with one end of the latch pivoted by a pin 37 in the slot 35 the latch is free to swing upwardly and the latch jack is dropped over the latches 17. After the latch jack has dropped below the latches, as shown in Figure 2 the latch 36 drops downwardly to a position below the latches 17, whereby as the latch jack is drawn upwardly the latches 17 are again actuated, as illustrated in Figure 3.

The upper end of the latch jack is provided with a threaded stud 33 to which a cable 39 may be attached by a coupling 40. In the design shown the sleeve is formed in two semi-circular sections, as illustrated in Figures 4 and 5.

With the parts arranged in this manner the slips 11 which are provided with serrated faces whereby they are adapted to grip in both directions providing two way slips and which are carried by the toggle or slip bars are actuated by the spring 16 when the sleeve 14 is released by the latches 17 to grip the inner surface of the wall casing 15 whereby the mandrel is retained in position by the locking elements.

In the use of the mandrel 10 is inserted in the well casing 15 with latch parts in a set position as illustrated in Figures 1 and 2 and when it is desired to anchor the mandrel the latch jack is dropped through the mandrel so that the legs 32 and 33 pass over the latches 17 until the latch 36 is dropped by gravity and the latch 35 is extended below the latches 17 the jack is drawn upwardly by the cable, actuating the latches 17 to the position shown in Figure 3 whereby the sleeve is released and the spring forces the slips into engagement with the well casing.

Upward movement of the mandrel the sleeve again compresses the spring 16 until the sleeve is held by the latches 17 and with the pins 24 of the upper latch or toggle bars 12 moved upwardly the slips 11 are drawn inwardly to released positions.

It will be understood that modifications may be made in the design and arrangement of the parts without departing from the spirit of the invention.

What is claimed is:

1. A well tube anchor comprising a tubular mandrel having radially disposed slots therein, upper toggle levers pivotally mounted in some of the slots of the mandrel, a sleeve slidably mounted on the mandrel, said sleeve having shoulders extended inwardly and said shoulders positioned in the slots in which the upper toggle levers are positioned, lower toggle levers pivotally mounted on said sleeve and positioned in the slots of the mandrel in which the upper toggle levers and shoulders are positioned, pins pivotally connecting the upper ends of the lower toggle levers to the lower ends of the upper toggle levers, slips pivotally connected to the upper and lower toggle levers by the pins connecting the levers, said slips facing outwardly of the mandrel, resilient means on the mandrel for urging said sleeve upwardly, latches pivotally mounted in the mandrel for retaining the sleeve in a downwardly disposed position, and means for actuating the latches from the upper end of the well tube for releasing the sleeve.

2. A well tube anchor comprising a tubular mandrel having radially disposed slots therein, upper toggle levers pivotally mounted in some of the slots of the mandrel, a sleeve slidably mounted on the mandrel, said sleeve having shoulders extended inwardly and said shoulders positioned in the slots in which the upper toggle levers are positioned, lower toggle levers pivotally mounted on said sleeve and positioned in the slots of the mandrel in which the upper toggle levers and shoulders are positioned, pins pivotally connecting the upper ends of the lower toggle levers to the lower ends of the upper toggle levers, slips pivotally connected to the upper and lower toggle levers by the pins connecting the levers, said slips facing outwardly of the mandrel, resilient means on the mandrel for urging said sleeve upwardly, latches pivotally mounted in the mandrel for retaining the sleeve in a downwardly disposed position, and means for actuating the latches from the upper end of the well tube for releasing the sleeve.

3. A well tube anchor comprising a tubular mandrel having radially disposed slots therein, upper toggle levers pivotally mounted in some of the slots of the mandrel, a sleeve slidably mounted on the mandrel, said sleeve having shoulders extended inwardly and said shoulders positioned in the slots in which the upper toggle levers are positioned, lower toggle levers pivotally mounted on said sleeve and positioned in the slots of the mandrel in which the upper toggle levers and shoulders are positioned, pins pivotally connecting the upper ends of the lower toggle levers to the lower ends of the upper toggle levers, slips pivotally connected to the upper and lower toggle levers by the pins connecting the levers, said slips facing outwardly of the mandrel, resilient means on the mandrel for urging said sleeve upwardly, latches pivotally mounted in the mandrel and extended around the mandrel, latches pivotally mounted in the mandrel for retaining the sleeve in a downwardly disposed position, and means for actuating the latches from the upper end of the well tube for releasing the sleeve.

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