Nov. 8, 1949 G. A. LOWREY 2,487,456

RELEASING SPEAR

Filed Oct. 25, 1946

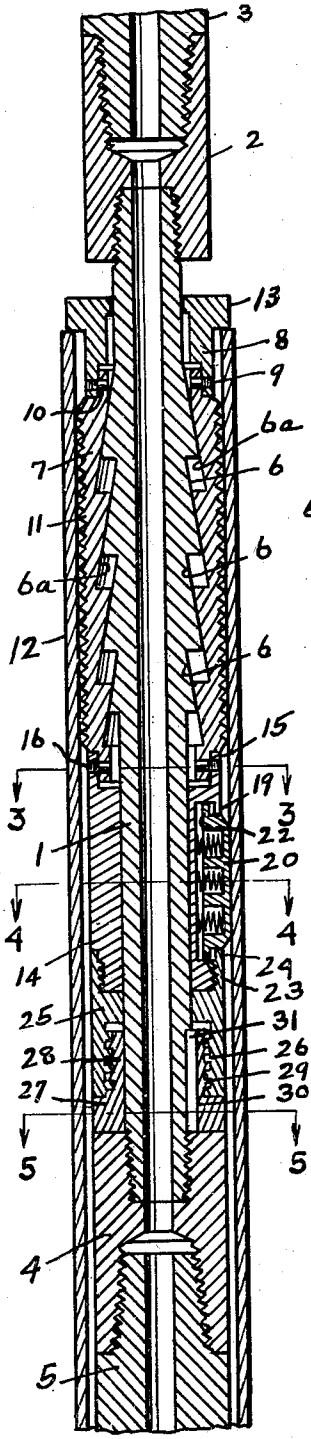


Fig. 1.

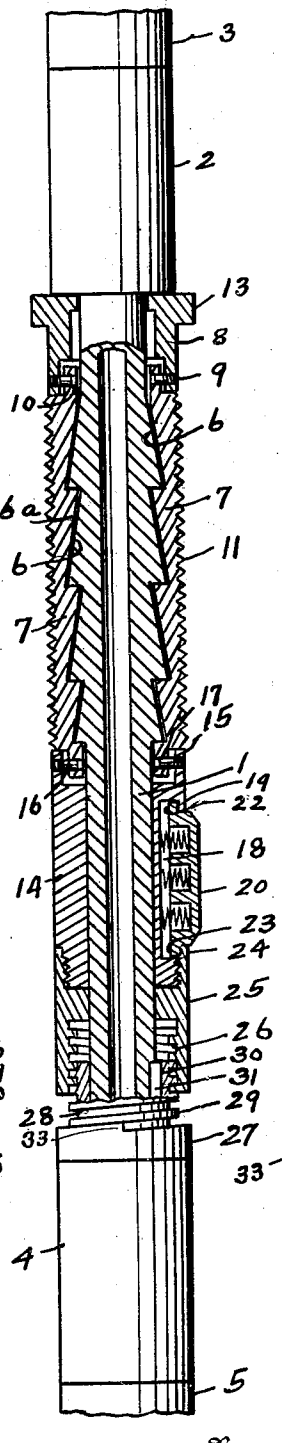


Fig. 2.

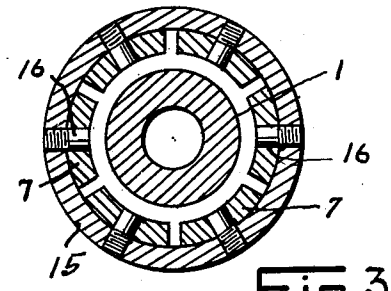


Fig. 3.

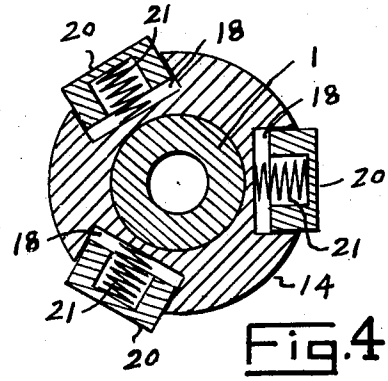


Fig. 4.

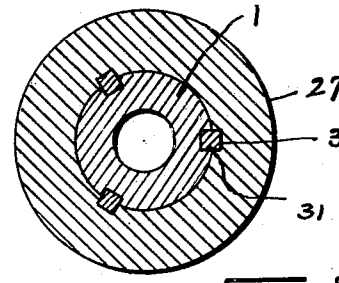


Fig. 5.

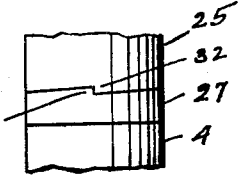


Fig. 6.

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RELEASING SPEAR

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6 Claims. (Cl. 294—102)

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This invention relates to a releasing spear.

An object of the present invention is to provide a spear, or pipe puller, adapted to be inserted into the upper end of a pipe to be removed from a well bore and which will securely engage the walls of the pipe to be pulled but which may be disconnected and easily released from the pipe and withdrawn from the well bore in case the pipe is so tightly stuck that it cannot be removed by the puller.

It is another object of the present invention to provide a releasing spear of the character described which is equipped with a release sleeve which is so shaped and assembled with the adjacent parts, that the spear can at all times be quickly and easily released and will not be liable to become stuck in the pipe to be pulled.

The spear is of such construction that it may be also used as a jar, while engaged with the pipe and by means of which the stuck pipe, if it cannot be removed by direct pull, can be jarred loose for removal from the bore.

With the above and other objects in view the invention has particular relation to certain novel features of construction, arrangement of parts and use, an example of which is given in this specification and illustrated in the accompanying drawings wherein:

Figure 1 is a vertical, sectional view of the spear shown in engagement with a pipe to be pulled.

Figure 2 is a side elevation, partly in section, showing the spear in collapsed, or released, position.

Figure 3 is a cross-sectional view taken on the line 3—3 of Figure 1.

Figure 4 is a cross-sectional view taken on the line 4—4 of Figure 1.

Figure 5 is a cross-sectional view taken on the line 5—5 of Figure 1, and

Figure 6 is a fragmentary, elevational view of the release sleeve and adjacent parts.

Referring now more particularly to the drawings wherein like numerals of reference designate the same parts in each of the figures, the numeral 1 designates a tubular mandrel whose upper end is connected into the lower end of the coupling 2 to which the tubular operating string 3, leading to the ground surface, is attached.

Screwed onto the lower end of the mandrel there is a tubular coupling 4 to the lower end of which the guide tube 5 is connected.

The upper end of the mandrel 1 is formed into a jaw expander having a series of similar frusto-conical shaped faces 6, 6 and surrounding the expander there are a plurality of jaws 7 whose upper ends are off set inwardly and fit within the tubular head 8.

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Pins 9 have their outer ends screwed into the head 8 and their inner ends extend loosely through radial bearings 10 through the upper ends of the corresponding jaws 7.

The outer sides of these jaws are provided with pipe engaging teeth 11.

The lower end of the head 8 is reduced in diameter to enter the upper end of the pipe 12 to be pulled and the upper end of said head 8 has an external annular flange 13 adapted to contact with the upper end of the pipe, as hereinafter explained.

Beneath the jaws 7 and closely surrounding the mandrel there is a tubular cage 14 whose upper end has an upstanding annular flange 15 which surrounds the lower ends of the jaws 7, said lower ends being externally reduced in diameter, as shown in Figures 1 and 2; and there are the pins 16 whose outer ends are screwed into the flange 15 and whose inner ends work loosely through radial openings 17 in the lower ends of the jaws 7. Said jaws are therefore mounted to expand and contract radially upon the relative longitudinal movement of the expander relative to the jaws.

In order to cause this expansion of the jaws and to permit their contraction the jaws are provided, on their inner sides, with the upwardly converging faces 6a which cooperate with and work against the corresponding faces 6 of the expander.

The cage 14 is provided with the countersunk seats 18 therein and the upper ends of these seats have the depending retaining flanges 19. Mounted in these seats 18 are the friction blocks 20 which are seated on the coil springs 21 whose outer ends bear against the blocks, and whose inner ends are seated against the bottom of the respective seats.

The friction blocks have the upper and lower end flanges 22 and 23. The upper flanges 22 are retained by the depending flanges 19 and the lower flanges 23 are retained by the annular flange 24 formed on the upper end of a coupling 25 which is screwed onto the lower end of the cage 14 and which closely surround the mandrel 1.

These friction blocks 20 extend out beyond the cage 14 and frictionally engage the pipe 12 when the spear is inserted into the pipe.

The lower end of the coupling 25 is formed with internal, coarse, right hand threads 26 and beneath this coupling there is a release sleeve 27

whose upper end is formed into a pin 28 having coarse external threads 29 adapted to be screwed into the lower end of the coupling 25.

The abutting ends of the coupling 25 and of the release sleeve have the oppositely pitched shoulders 32 and 33 which are arranged to abut when the coupling 25 is screwed onto the pin 28 to prevent these parts from screwing so tightly together that they cannot readily be unscrewed.

The release sleeve 27 is provided with inside, longitudinal, keyways 30 extending from end to end thereof and seated in the mandrel 1 there are external longitudinal keys 31 which project into said keyways which prevent the turning of the release sleeve relative to the mandrel but which permits longitudinal movement of the mandrel relative to the release sleeve.

In use the spear may be assembled, as shown in Figure 2, with the pin 28 screwed downwardly into its lower position relative to the coupling 25. This will have the effect of moving the expanding faces 6 downwardly relative to the corresponding faces 6a of the jaws 7 allowing the jaws to contract and this downward movement will be stopped when the jaw expander engages the inside shoulders of the jaws 7.

The tool may then be lowered into the upper end of the pipe 12 until the flange 13 lands on the upper end of said pipe. The operating string 3 and mandrel 1 may then be turned to the left causing the pin 28 to be screwed up into the lower end of the coupling 25 thus moving the expanding faces 6 upwardly relative to the jaws causing the jaws to expand into engagement with the pipe 12 to be pulled.

The upward movement of the release sleeve will be stopped by its engagement with the lower end of the coupling 25.

Upon an upward pull of the operating string 3 the expanding faces 6 will wedge between the corresponding jaw faces 6a so that the jaws will be maintained in secure engagement with the pipe 12 and upon further upward movement of the operating string 3 a pull will be taken on the stuck pipe to release the same and upon release of the pipe it may be withdrawn to the ground surface.

Should the pipe 12 be difficult to dislodge from the bore the operating string may be released and allowed to drop causing the lower end of the coupling 2 to strike the upper end of the head 8 thus imparting a jar to the stuck pipe and this jarring process may be repeated as often as desired. The splined connection between the mandrel 1 and the release sleeve 27 allows this longitudinal movement of the mandrel relative to the release sleeve while the tool is being used as a jar and without releasing the jaws 7 from the pipe 12. When the jarring process has been completed an upward pull on the operating string 3 will cause the expander to again expand the jaws into secure engagement with the pipe 12.

In order to release the spear from the pipe, in case the pipe cannot be pulled, the operating string and mandrel may be turned to the left and the pin 28 thus screwed downwardly relative to the coupling 25 causing a downward movement of the expander relative to the jaws thus allowing the jaws to contract. However, the coupling 2 will contact with the head 8 before the pin 28 is completely unscrewed from the coupling 25 to prevent their complete separation.

During the turning movement of the mandrel the coupling 25, the cage and the jaws as well as the head 8 are held against turning by reason of the friction of the blocks 20 with the pipe 12.

The drawings and description are illustrative merely while the broad principle of the invention will be defined by the appended claims.

What I claim is:

1. A releasable spear for removing a stuck pipe from a well bore and comprising, a mandrel having downwardly flared jaw-expanding means thereon, an assembly of radially movable jaws around the expanding means whose outer sides are toothed and whose inner sides are shaped to conform to the contour of the expanding means, a release sleeve longitudinally movable on, and having a splined connection with the mandrel, means for limiting the longitudinal movement of the release sleeve on the mandrel, a tubular assembly around the mandrel having a threaded connection with the release sleeve and a frictional engagement with the stuck pipe and being also connected with the jaws, whereby upon rotation of the mandrel the expanding means will be moved longitudinally relative to the jaws.

2. A releasable spear comprising, a mandrel having downwardly flared jaw-expanding means thereon, an assembly of radially movable jaws around the expanding means whose outer sides are toothed to engage the inside of a pipe into which the spear is inserted and whose inner sides are shaped to conform to the external contour of the expanding means, a release sleeve splined on the mandrel to move longitudinally thereon, means for limiting the longitudinal movement of said sleeve on the mandrel, a tubular assembly around the mandrel having a threaded connection with the release sleeve and also having means for frictionallly engaging with said pipe, said tubular assembly being also connected with the jaws, whereby upon rotation of the mandrel in a selected direction the expanding means will be correspondingly moved longitudinally relative to the jaws to expand, or permit contraction of, said jaws.

3. A releasable spear comprising, a mandrel having downwardly flared jaws, expanding means thereon, an assembly of radially movable jaws around the expanding means whose outer sides are toothed to engage the inside of a pipe into which the spear is inserted and whose inner sides are shaped to conform to the external contour of the expanding means, a release sleeve splined on the mandrel, a tubular assembly around the mandrel having a threaded connection with the release sleeve and also having means for frictionally engaging with said pipe, said tubular assembly being also connected with the jaws, whereby upon rotation of the mandrel the expanding means will be moved longitudinally relative to the jaws to expand, or permit contraction of, said jaws and means on the mandrel for limiting the movement of the release sleeve relative to the mandrel and said tubular assembly.

4. A releasable spear shaped to enter a pipe in a well bore and comprising, a mandrel having downwardly flared jaw-expanding means thereon, an assembly of radially movable jaws around the expanding means whose outer sides are toothed and whose inner sides are shaped to conform to the contour of the expanding means, a head loosely connected to the upper ends of the jaws and through which the mandrel extends and adapted to land on the upper end of the pipe upon insertion of the spear into the pipe, a release sleeve having a limited splined connection with the mandrel, a tubular assembly around the man-

drel having a threaded connection with the release sleeve and a frictional engagement with the stuck pipe and being also loosely connected with the lower ends of the jaws whereby upon rotation of the mandrel the expanding means will be moved longitudinally relative to the jaws.

5. A releasable spear shaped to enter a pipe in a well bore and comprising, a mandrel having downwardly flared jaw expanding means thereon, an assembly of radially movable jaws around the expanding means whose inner sides are shaped to conform to the contour of the expanding means, a head loosely connected to the upper ends of the jaws and through which the mandrel extends and adapted to land on the upper end of the pipe upon insertion of the spear into the pipe, a release sleeve having a limited splined connection with the mandrel, a tubular assembly around the mandrel having a threaded connection with the release sleeve and being loosely connected with the lower ends of the jaws, friction means on said tubular assembly arranged to frictionally engage the pipe whereby upon rotation of the mandrel in one direction said mandrel will be moved longitudinally relative to the jaws to expand the jaws and when rotated in the other direction will move the mandrel longitudinally relative to the jaws to permit the jaws to contract and impact means on the upper end of the mandrel arranged to strike said head upon a sudden downward movement of the mandrel to impart a jar to the spear.

6. A releasing spear for removing a stuck pipe from a well bore and comprising, a mandrel having downwardly flared jaw expanding means thereon, an assembly of radially movable jaws around the expanding means whose inner sides are shaped to conform to the contour of the expanding means and whose outer sides are engageable with the stuck pipe, a release sleeve having a limited splined connection with the mandrel, a tubular assembly around the mandrel having a threaded connection with the release sleeve and a frictional engagement with the stuck pipe and being also connected with the jaws whereby upon rotation of the mandrel the expanding means will be moved longitudinally relative to the jaws, said tubular assembly and release sleeve having shoulders arranged to interengage when the release sleeve is screwed home in the tubular assembly.

GEORGE A. LOWREY.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,815,376	Jones	July 21, 1931
2,191,000	Thomas	Feb. 20, 1940