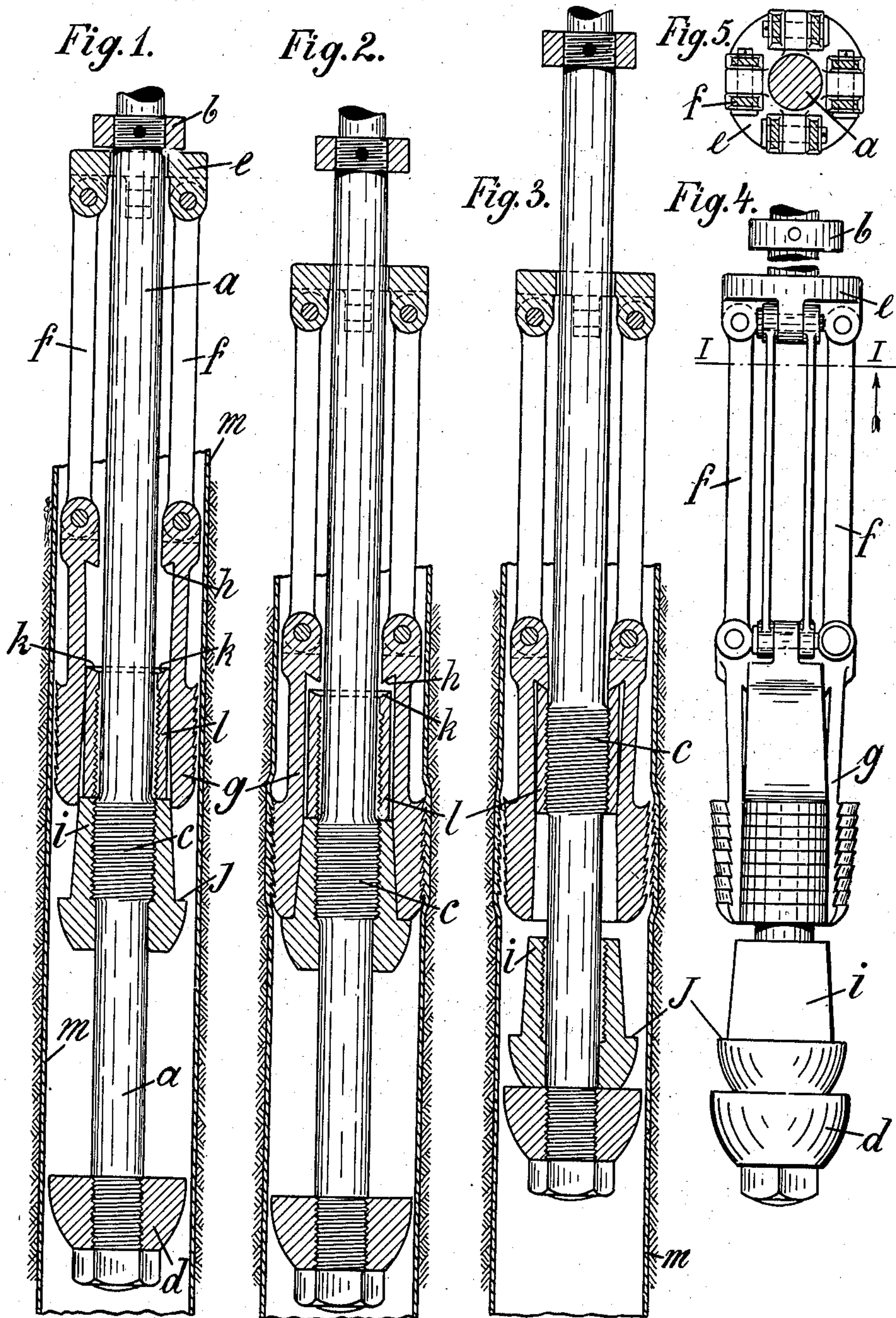


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PATENTED SEPT. 10, 1907.

J. BIENFAIT.  
GRAPNEL FOR BORING TUBES.  
APPLICATION FILED MAY 14, 1907.



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# UNITED STATES PATENT OFFICE.

JOHN BIENFAIT, OF THE HAGUE, NETHERLANDS.

## GRAPNEL FOR BORING-TUBES.

No. 865,756.

Specification of Letters Patent.

Patented Sept. 10, 1907.

Application filed May 14, 1907. Serial No. 373,601.

To all whom it may concern:

Be it known that I, JOHN BIENFAIT, engineer, a subject of the Queen of the Netherlands, residing at The Hague, Kingdom of the Netherlands, van Lennepweg No. 1, have invented certain new and useful Improvements in or Relating to Grapnels for Boring-Tubes, of which the following is a specification.

This invention relates to appliances, known as crabs or grapnels (hereinafter called grapnels) employed in well sinking and the like, for withdrawing the usual boring tubes, and the object of the invention is to provide devices adapted to prevent such appliances from remaining stuck in the boring tubes.

The many appliances heretofore proposed and employed for bringing the used boring tubes to the surface again are all subject to the disadvantage that under some circumstances the grapnels get stuck in the boring tubes and cannot be removed so that the bore hole becomes stopped up or choked.

According to the present invention the grapnels are so constructed that while capable of being jammed hard and fast against the walls of the tubes a never failing and rapid release of the jamming action or of the grapnel is always insured.

According to this invention the freely suspended jaws of the grapnel, after the sinking of the recovering rod which carries them and on the subsequent rapid raising—or jerking—of such rod, are moved apart by a conical wedge piece so that the jaws grip the inner wall of the boring tube. For the purpose of subsequently removing the wedge piece away from between the jaws it is unscrewed therefrom by rotating the rod, moved down the rod in any suitable manner, and caught up as by a collar or head on the rod. The gripping ends of the jaws can now approach each other and the grapnel can be brought to the surface, the jaws remaining suspended on a rotary sleeve nut while being raised.

The improved appliance is particularly simple in its construction.

Figures 1, 2 and 3 of the accompanying illustrative drawings show one construction of the improved appliance in section in different positions in a boring tube: Fig. 4 is a side view thereof, and Fig. 5 is a section corresponding to the line I—I of Fig. 4 looking in the direction of the arrow.

The pull rod *a* is attached to the recovery rod in the usual way and is provided at its upper end with a collar *b* and intermediate between its two ends, is formed with a screw threaded portion *c*. To the lower end of the pull rod is screwed a head *d*. Below the collar *b* is a carrier ring *e* which is arranged to slide up and down upon the rod and upon which are hinged links *f*. Suspended by hinge pins from the links *f* are four jaws *g* which are toothed on their outer faces to grip a tube. Each jaw *g* is suspended from two links *f*. The face or toothed portion of the jaw is circular and at their lower

ends the inner face of each jaw is slightly tapered, as seen in Fig. 4.

Immediately under the points where the jaws are pivoted to the links tooth shaped projections *h* are formed on the inner face of the jaws. An internally threaded conical wedge piece *i* of quadrangular section and formed near its lower end a shoulder *j* is screwed on to the screw threaded portion *c* of the pull rod *a*. Upon the wedge piece *i* rests a quadrangular nut *l* formed at the top with a sunk edge *k* and which is screw threaded similar to the wedge piece, Fig. 1, although as will be seen this screw thread does not extend right up to the top edge of the nut.

The boring tube shown is marked *m*.

The operation of the improved appliance is as follows:—In Fig. 1 the grapnel is supposed to be in the desired position in the boring tube. As can be seen, in this position, the quadrangular wedge piece *i* is screwed onto the portion *c* of the pull rod *a* and the quadrangular nut *l* rests free upon the wedge piece *i*; the carrier ring *e* is in contact with the collar *b* and the various parts are so constructed that the jaws, which lie freely against the inner wall of the tube *m* are also in contact at their ends with the four sides of the wedge piece *i*. It will be seen that in this condition the grapnel can be freely introduced into the boring tube *m* the head *d* flattening any small inwardly projection dented portion of the tube wall according to circumstances. When the grapnel has been lowered to the desired depth the recovery rod is pulled upwardly with considerable force as by a block and tackle and the wedge piece *i* is thereby drawn up between the jaws *g* so causing them to expand, Fig. 2. Owing to their internal conical shape and their movable suspension this expanding movement is a parallel one whereby the teeth penetrate with force into the wall of the boring tube over the entire length of the toothed part of the jaws and almost over the entire circumference of the tube at that part. The shoulder *j* of the wedge piece *i* prevents the wedge piece *i* being drawn too high and so limits the expansion of the jaws, Fig. 2, that the wall of the tube cannot be bent out too much or torn. As can be seen the tube can now be lifted in a suitable and usual way. Should it happen that the tubes remain too firmly fixed then the particular part thereof is abandoned and cut off. In this case however the grapnel must be previously removed from the tube. This is accomplished by first disconnecting the pull rod from the wedge piece *i* and then screwing its threaded portion *c* into the quadrangular nut *l*. When using recovering rods with right handed screw threads for the connecting sleeves the screw thread at *c* must be correspondingly left handed and vice versa. The rod is rotated to the right until the screw thread at *c* is completely screwed into the nut *l* and the sunk edge *k* strikes the tooth shaped projections *h* of the jaws. The wedge piece *i* is then moved clear



of the jaws by allowing the whole weight of the recovering rod to rest upon the pull rod or by giving heavy blows to the recovering rod. These blows are transmitted directly through the quadrangular nut *l* to the wedge piece so as to release it, after which the wedge piece falls down onto the head *d*. The jaws *i* are consequently released and the four projections *h* become firmly engaged in the sunk edge *k* of the quadrangular nut thus insuring a rigid connection of the carrier bars *f* and of the jaws *g*. The grapnel, which then hangs from the quadrangular nut *l*, can now be very easily withdrawn from the tube *m*, (Fig. 3) without running the risk of the bars *f* being broken or turned off.

The arrangement offers the following advantages:—

1. The grapnels can be disconnected and drawn up at any time.
2. When drawing up the grapnel after disconnecting the wedge piece *i* it remains hanging by the tooth shaped projections *h*.
3. Owing to there being two hinges or pivot points the jaws always remain in their vertical position and therefore bear upon the boring tube over their whole length of jaw proper.
4. One and the same appliance can be used for different diameters of tubes by changing the jaws and the heads.
5. When the appliance is inserted in a tube the head screwed on the lower end of the rod will bend out again or flatten any slightly dented in places on the tubes.

What I claim is:—

1. In grapnels for boring tubes, a pull rod formed with a screw threaded portion, a carrier mounted to slide on said rod, gripping jaws suspended from said carrier, a wedge piece adapted to be screwed on the threaded portion of said rod and to expand said jaws, and a nut on said rod above said wedge piece adapted to be screwed on said rod and to engage said jaws, substantially as set forth.
2. In grapnels for boring tubes, a pull rod formed with a screw threaded portion, a carrier mounted to slide on said rod, gripping jaws suspended from said carrier, a wedge piece adapted to be screwed on the threaded portion of said rod and to expand said jaws, a collar on said rod that bears on said carrier when the lower ends of said jaws engage the narrow end of said wedge piece if screwed on the threaded portion of said rod, and a nut on said rod above said wedge piece adapted to be screwed on said rod and to engage said jaws, substantially as set forth.
3. In grapnels for boring tubes, a pull rod formed with a screw threaded portion, a carrier mounted to slide on said rod, gripping jaws suspended from said carrier, a wedge piece adapted to be screwed on the threaded portion of said rod and to expand said jaws, a head on said rod below said wedge adapted to flatten out inwardly dented portions of a boring tube, and a nut on said rod above said wedge piece adapted to be screwed on said rod and to engage said jaws, substantially as set forth.
4. In grapnels for boring tubes, a pull rod formed with a screw threaded portion, a carrier mounted to slide on said rod, links pivoted to said carrier, gripping jaws, pivoted to said links, a wedge piece adapted to be screwed on the threaded portion of said rod and to expand said jaws, and a nut on said rod above said wedge piece adapted to be screwed on said rod and to engage said jaws, substantially as set forth.
5. In grapnels for boring tubes, a pull rod formed with a screw threaded portion, a carrier mounted to slide on said rod, links pivoted to said carrier, gripping jaws each formed at its lower end with an inclined face at its inner

side pivoted to said links, a wedge piece adapted to be screwed on the threaded portion of said rod and to cooperate with the inclined inner faces of said jaws, and a nut on said rod above said wedge piece adapted to be screwed on said rod and to engage said jaws, substantially as set forth.

6. In grapnels for boring tubes, a pull rod formed with a screw threaded portion, a carrier mounted to slide on said rod, gripping jaws suspended from said carrier, a wedge piece adapted to be screwed on the threaded portion of said rod and to expand said jaws, a shoulder near the lower end of said wedge piece adapted to form a stop for the lower ends of said jaws, and a nut on said rod above said wedge piece adapted to be screwed on said rod and to engage said jaws, substantially as set forth.

7. In grapnels for boring tubes, a pull rod formed with a screw threaded portion, a carrier mounted to slide on said rod, gripping jaws suspended from said carrier, projections on said jaws, a wedge piece adapted to be screwed on the threaded portion of said rod and to expand said jaws, and a nut on said rod above said wedge piece adapted to be screwed on said rod and to engage said jaw projections, substantially as set forth.

8. In grapnels for boring tubes, a pull rod formed with a screw threaded portion, a carrier mounted to slide on said rod, gripping jaws suspended from said carrier, projections on said jaws, a wedge piece adapted to be screwed on the threaded portion of said rod and to expand said jaws, and a nut formed with an undercut upper edge on said rod above said wedge piece adapted to be screwed on said rod and the upper edge of which is adapted to engage said jaw projections, substantially as set forth.

9. In grapnels for boring tubes, a pull rod formed with a screw threaded portion, a collar fixed on said rod, a carrier mounted to slide on said rod below said collar, links pivotally suspended from said carrier, tube gripping jaws pivotally suspended from said links, tooth-like projections on said jaws, a wedge piece on said rod adapted to be screwed on the screwed portion of said rod, and a nut on said rod the upper end of which is adapted to engage said jaw projections normally resting on the upper end of said wedge piece and adapted to engage the screw threaded portion of said rod as the said wedge piece is unscrewed therefrom, substantially as set forth.

10. In grapnels for boring tubes, a pull rod formed with a screw threaded portion, a collar fixed on said rod, a carrier mounted to slide on said rod below said collar, links pivotally suspended from said carrier, four tube gripping jaws pivotally suspended from said links, tooth-like projections on said jaws, a wedge piece of quadrangular cross section mounted on said rod adapted to be screwed on the screwed portion of said rod, and a quadrangular nut on said rod the upper end of which is adapted to engage said jaw projections normally resting on the upper end of said wedge piece and adapted to engage the screw threaded portion of said rod as the said wedge piece is unscrewed therefrom, substantially as set forth.

11. In grapnels for boring tubes, a pull rod, a carrier mounted to slide on said rod, jaws pivotally suspended from said carrier, means on a screw threaded portion of said rod adapted to force said jaws outwardly upon endwise movement of said rod, a nut located above said jaw forcing means adapted upon rotation of said rod in a direction to release said jaw forcing means to itself engage the screw threaded portion of said pull rod, and tooth like projections on said jaws adapted to be engaged by said nut when screwed on said rod.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOHN BIENFAIT.

Witnesses:

THOMAS HERMANN VERHAVE,  
AUGUST SIEGFRIED DOER.