(No Model.)

2 Sheets—Sheet 1.

P. H. MACK.

CASING SPEAR.

No. 492,371. Patented Feb. 21, 1893.

Fig. I.

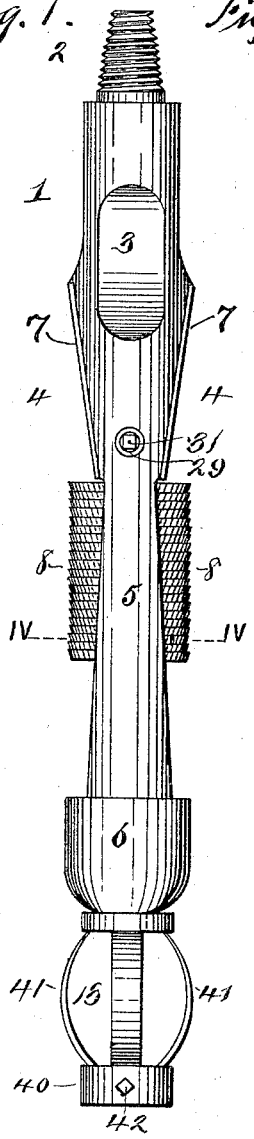


Fig. II.

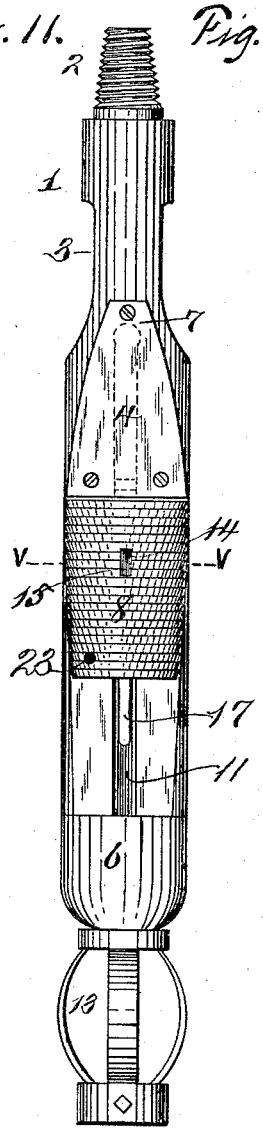


Fig. III.

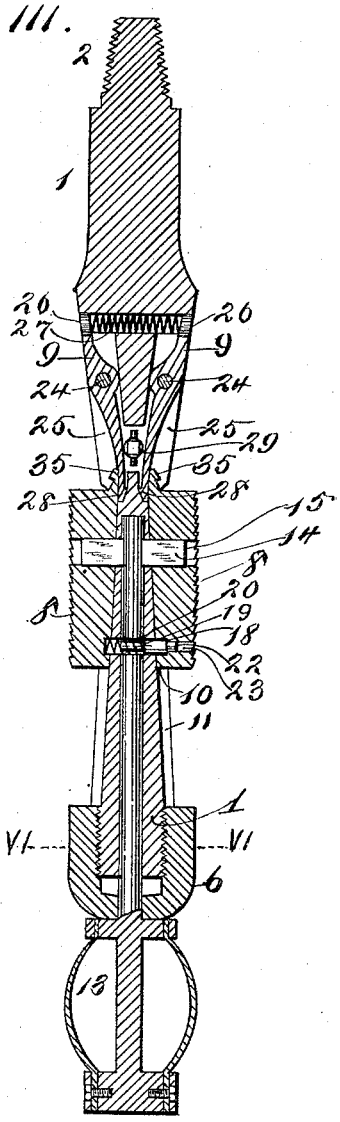


Fig. IV.

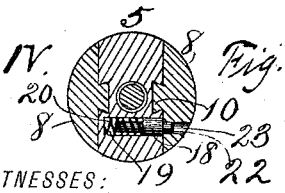


Fig. V.

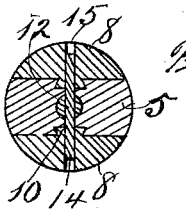
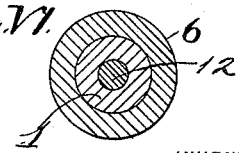


Fig. VI.



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(No Model.) 2 Sheets—Sheet 2.

P. H. MACK.

CASING SPEAR.

No. 492,371. Patented Feb. 21, 1893.

Fig. VII.

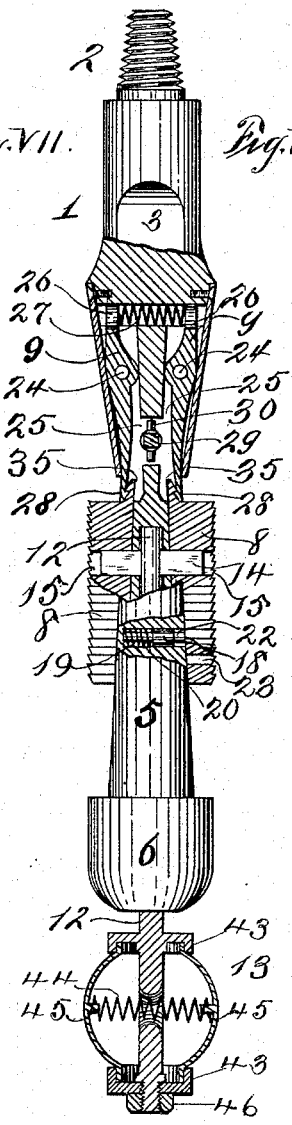


Fig. VIII.

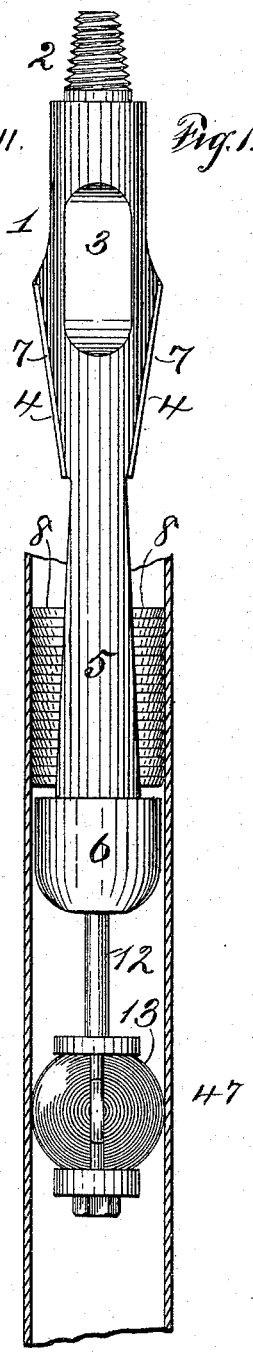


Fig. IX.

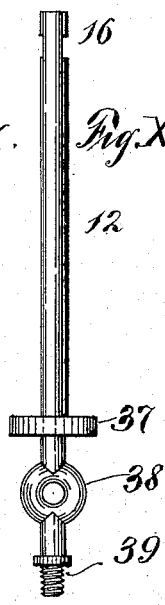


Fig. X.

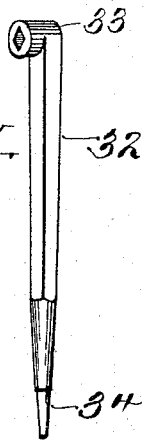


Fig. XI.

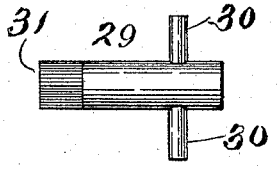
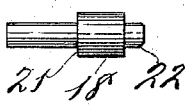


Fig. XII.



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UNITED STATES PATENT OFFICE.

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CASING-SPEAR.

SPECIFICATION forming part of Letters Patent No. 492,371, dated February 21, 1893.

Application filed April 23, 1892. Serial No. 430,433. (No model.)

To all whom it may concern:

Be it known that I, PATRICK H. MACK, a citizen of the United States, residing at Bradford, in the county of McKean, in the State of Pennsylvania, have invented new and useful Improvements in Casing-Spears, of which the following is a specification.

My invention relates to that class of instruments for removing casing or sections of tubes from wells, in which divided slips are mounted upon a mandrel capable of longitudinal movement thereon and having a supplemental lower grip connected with the slips for the purpose of causing them to move upon the spreading mandrel and secure the initial hold upon the tube, which hold afterward is sufficient to secure that relative movement between the slips and mandrel which results in the secure gripping of the tool in the pipe.

My invention consists in certain features of novelty involved in the construction of respective parts which will hereinafter be particularly pointed out in the claims and first fully described with reference to the accompanying drawings, in which:—

Figure 1 is a side elevation of my improved tool. Fig. 2 is a similar view of the tool in a position at right angles to that shown in Fig. 1. Fig. 3 is an axial section of the tool in a plane parallel to the plane of Fig. 1 and at right angles to the plane of Fig. 2. Figs. 4, 5 and 6 are transverse sections taken respectively on the lines 4—4 Fig. 1, 5—5 Fig. 2, and 6—6 Fig. 3. Fig. 7 is a side elevation of the tool partly in section, the plane being parallel to that of Fig. 1 and the position of the slips upon the mandrel being shifted and held in such shifted position by means of the retaining-dogs, in which position the tool is ready for use. Fig. 8 represents the tool within a tube, the slips having moved a sufficient distance upon the mandrel to secure a rigid hold upon the tube to be lifted. Figs. 9, 10, 11 and 12, are detail views respectively of the initial grip-rod, the operating-wrench, the spreading-key for forcing the dogs into the position shown in Fig. 7, and the locking bolt for locking the slips in the position shown in Fig. 3 as is done when the tool is to be withdrawn from the well without the section.

1 represents the body of the tool which is formed with a screw-head 2, flattened portion 3, beveled sides 4, mandrel 5 and cup 6. The flattened portion 3 adapts the tool for receiving a wrench which screws it on and off and from the drilling tools. The beveled sides 4 receive plates 7 which cover recesses formed in the body above the mandrel for the reception of a pair of dogs 9 which operate to retain the slips 8 in intermediate position when the tool is put into use, which position is shown by Fig. 7. The slips have dove-tails 10 which fit in corresponding grooves 11, formed parallel with the opposite faces of the tapered mandrel as shown in Figs. 2, 3 and 5, whereby said slips are held upon the mandrel and adapted to be spread by relative movement thereon. Passing centrally upward from the body of the tool, is the initial grip-rod 12 having at its lower end a peculiarly formed grip 13 and connected at its upper end with the slips 8, by means of a key 14, which passes through slots 15 in said slips, and the slot 16 in said initial grip-rod. In order to permit the movement of the slips by means of the grip-rod, the mandrel portion of the body is provided with a vertical slot 17 which communicates with the perforation through which the rod 12 passes, so that the key 14 may readily move up and down with the slips.

18 represents a bolt mounted in the recess 19 in the mandrel and outside of the axis of said mandrel, and this bolt has a spring 20 surrounding the reduced portion of the bolt and abutting against its shoulder 21, while the forward reduced end 22 of said bolt enters a socket 23 in the slip. There may be only one of these locking bolts, inasmuch as the two slips are secured together, by the key 14 or there may be two of them, one on each side. The object of this bolt 18 is to lock the slips in their uppermost position automatically, and permit the withdrawal of the tool from the well without binding.

The dogs 9 are pivoted at 24 in recess 25 formed in the body of the tool above the mandrel, and these dogs have at their upper ends bearings 26 for a spring 27 which serves to force the ends apart, while at their lower ends said dogs are provided with hooks 28. The recess 25 is so formed as to permit the ends 28 of the dogs to set in a sufficient distance to permit the slips 8 to move up around them.

29 represents the spreading-key preferably

permanently mounted in the body transversely to the plane of the recesses 25, and this key is rendered larger on one diameter than on the other by means of pins or projections 30. This key has a square head 31 for the reception of a wrench, so that said key may be turned to force the ends 28 asunder in opposition to the spring 27.

In order to turn the key, I provide a tool 32 having a socket 33 which engages over the head 31, as will readily be seen. On the other end of this tool is a reduced projection 34 which is adapted to enter the perforation 23 and force back the bolt 18 in order that the slips may be moved downward upon the mandrel a sufficient extent to free the ends 28 of the dogs 9. When these ends are thus freed they are spread apart by the key 29. Hook projections 35 on the slips are then passed up between said dogs, after which the key is turned to its normal position, and the hooking ends 28 and 35 engage each other so as to hold the slips in the intermediate position shown by Fig. 7. When the tool is in this position it is ready for use. It may be lowered into the well until it passes within the tube-section a sufficient distance, the supplemental grip 13 being thereby compressed and caused to bind therein. The slips cannot be moved upward in this operation by the supplemental grip 13 because of the position of the ends 28 of dogs 9. Having passed a sufficient distance within the tube section, the tool is drawn upward slightly. By this operation the supplemental grip 13 operates to drag the slips away from the ends 28 of the dogs. This movement will be continued until the slips secure a hold in the wall of the tube, after which a further movement will cause the mandrel to move upward relatively to the slips and force the upwardly inclined teeth of the slips into the metal of the tube. The tool being thus securely connected with the tube section and continued movement serves to raise the latter from the well. This position of the tool in the tube is shown clearly by Fig. 8. Should it be desired to release the tube or casing for any cause, as for instance, when the tool is used for lowering the casing into the well, a sudden downward movement, will cause the mandrel to drop a certain distance relatively to the slips, the ends 28 having previously returned to their normal positions as shown in Fig. 3, whereupon the bolt 18 will enter the socket 23 in the slips and the tool will be locked into inoperative position, after which it may be withdrawn readily from the well.

For the purpose of affording a stop or abutment for the slips at the lower end of the dog, a cup 36 is screwed onto the lower end of the body as shown more clearly by the sectional view Fig. 3.

The initial grip-rod 12 carries at its lower end a collar 37 and eye 38 and the threaded end 39, to receive an additional collar 40. The supplemental grip may consist either in the series of spring-bows 41 as shown in Figs. 1, 2 and 3 having their ends secured in sockets formed in the respective collars 37 and 40 by means of screws 42, or said supplemental grip may consist in bows 41 having their ends set between flanged collars 43 as shown in Fig. 7 and forced asunder by means of the spring 44 which passes through the eye 38 and is seated around lugs 45 formed in the inner base 41. In this form the lower collar may be secured by means of a nut 46. Or as a further modification, this supplemental grip may consist in a spherical body as 47, formed in two parts and forced asunder in any suitable manner as by means of the spring 44 shown in Fig. 7.

In using my improved casing-spear, the parts being in position shown by Figs. 1, 2 and 3, and the bolt 18 being engaged in the socket 23, said bolt is forced back by means of the end 34 of the wrench 32, after which the slips are pushed down a sufficient distance to free the lower ends of the dogs 9, so that the spreading-key 29 may be turned by the application of the head 33 of the wrench 32 to the nut 31 of said key and the dogs forced into the position shown in Fig. 7. The slips are then pushed upward until their hooked ends 35 engage the correspondingly formed ends 28 of the dogs 9, when the spear is ready to be lowered into the well. On entering the pipe or section, the auxiliary or supplemental grip 13 binds in said section but cannot operate to force the slips upward owing to the position of the dogs 9. The tool may therefore be forced a sufficient distance into the section to enable the slips 8 to come in contact with the walls of said section. When the spear has reached the desired point it is raised so that the supplemental grip 13 through the medium of the controlling rod 12, will pull the slips down from engagement with the dogs and held down while the mandrel passes up between the slips and forces them into rigid engagement with the casing. Having reached their lower limit of movement, or being bound tightly upon the wedge-shaped mandrel, continued movement of the tool upward will draw the section with the tool. Should it be desired for any purpose to release the section, the upward movement of the tool may be suddenly reversed, when the mandrel will drop relatively to the slips a sufficient distance to allow the bolt 18, by its ends 22, to engage in the recess 23 and lock the slips in their permanent position, after which, there can be no binding effect of the slips in the section, and the tool may be withdrawn with ease.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. In a casing spear, the combination of the body formed with the mandrel, the longitudinally movable and expansible slips surrounding the mandrel, and the pair of locking dogs mounted in the body above the slips and

adapted to engage them and a spring connected with the dogs for holding them out of engagement when the slips are released, substantially as and for the purpose set forth.

2. In a casing-spear, the combination of the body, formed with the mandrel, the longitudinally movable and laterally expansible slips surrounding the mandrel, the pair of spring-pressed dogs mounted on the body above the slips and normally out of engagement with the slips; said slips having an extension adapted to enter between and engage the dogs, substantially in the manner and for the purpose set forth.

3. In a casing-spear, the combination of the body, formed with the mandrel, the expansible slips surrounding said mandrel whereby upward movement of the mandrel within the slips causes them to grip the tube, and the self-releasing means for preventing the relative movement between the slips and the mandrel when the tool is lowered, consisting of the notched extension on the mandrel and the pair of dogs mounted in a recess in the body and adapted by their respective ends to engage the slips, and springs for forcing them out of engagement when released from the slips, a recess being extended as shown to receive the ends of the dogs whereby the slips move up around them for the purpose explained.

4. In a casing-spear, the combination of the body formed with the mandrel, the surrounding expansible slips on the mandrel, the beveled upper portion of the body having a recess, the automatically releasing and retaining dogs, mounted in said recess, and the plates for covering the dogs, substantially as and for the purpose set forth.

5. In a casing-spear, the combination of the body formed with the mandrel, the expansible slips surrounding the mandrel, the automatic releasing and retaining dogs for engagement with the slips as explained, and the spreading-pin located between the dogs for forcing them apart in the manner and for the purpose set forth.

6. In a casing-spear, the combination of the body formed with the mandrel, the slips mounted upon the mandrel, the supplemental grip consisting of the pair of disks, and the curved springs having their ends secured loosely in the respective disks and a rod projecting from the supplemental grip upward through the body and connected with the slips by means of the cross-key; said body or mandrel being formed with an elongated slot in which the key works, substantially as and for the purpose set forth.

7. In a casing-spear, the combination of the body formed with a mandrel and having the slips mounted upon the mandrel, and supplemental grip device adapted for frictional contact with the wall of the casing and having working connection with the slips; said supplemental grip consisting of the spherically or cylindrically formed compressible parts, with the interposed spring for forcing the parts asunder constructed in substantially the manner specified.

PATRICK H. MACK.

Witnesses:
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W. G. LONG.