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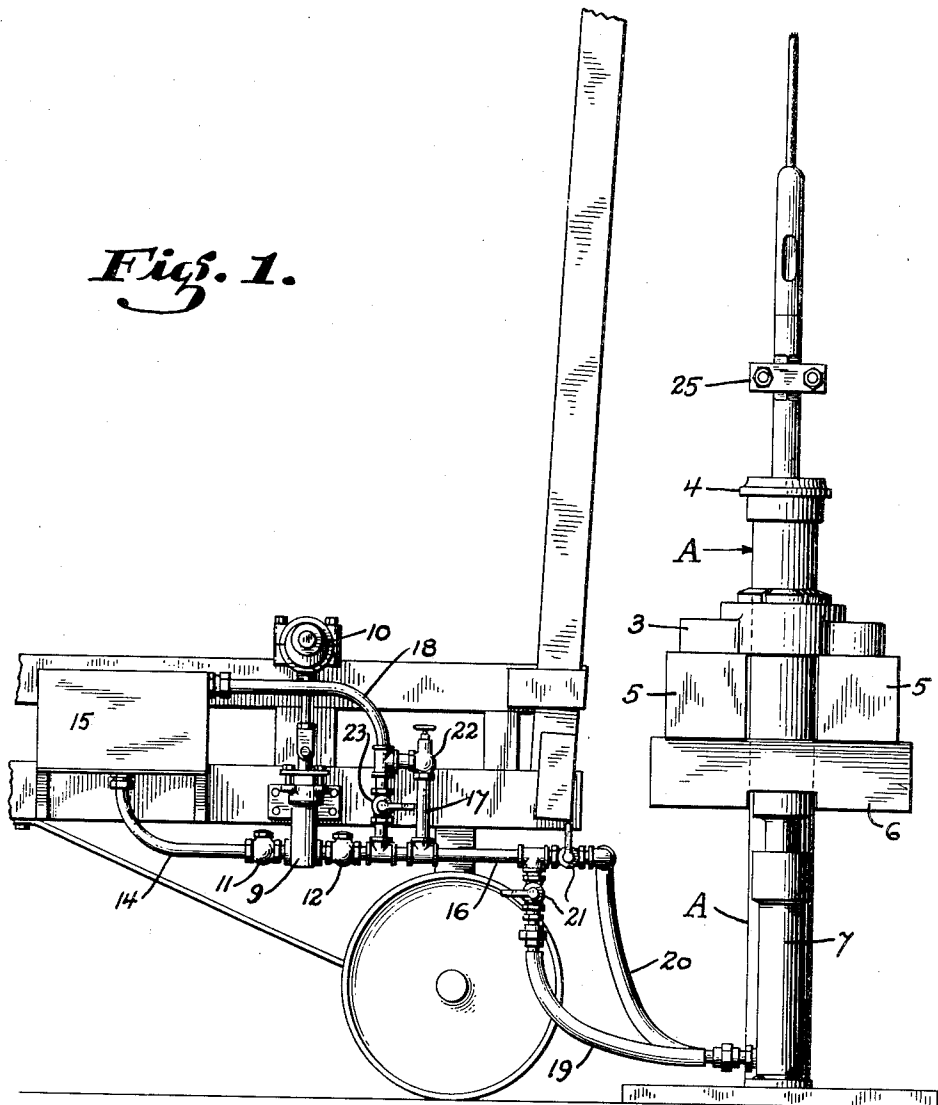
1,929,055

CASING PULLER AND METHOD OF PULLING A CASING

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2 Sheets-Sheet 1

Fig. 1.



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Fig. 2.

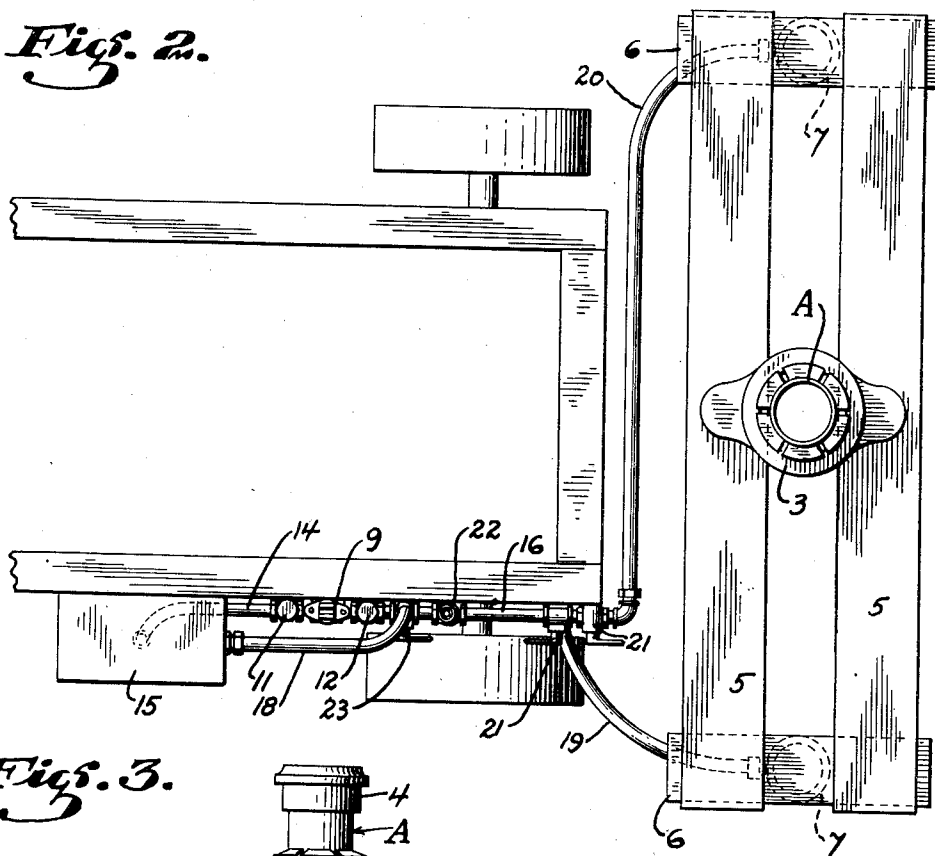
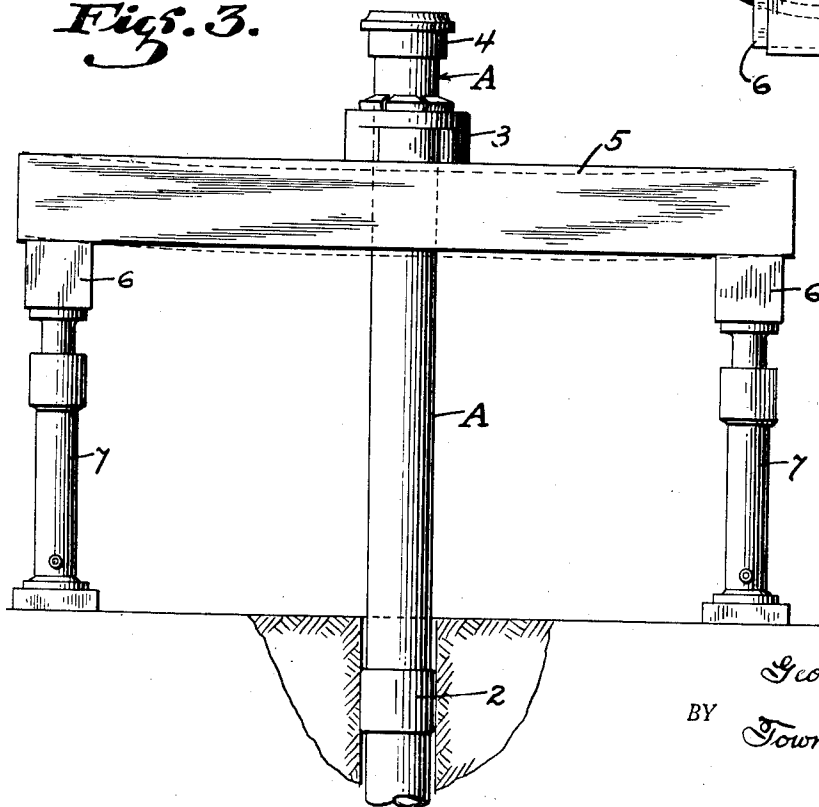


Fig. 3.



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CASING PULLER AND METHOD OF PULLING
A CASING

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4 Claims. (Cl. 254—30)

This invention relates to a method and apparatus for pulling casings such as used in well drilling, prospecting, etc.

Modern prospecting of mineralized areas, for instance gold paying placer deposits, embodies the use of a portable drill rig usually of the drop or churn drill type. This work involves the driving of a test casing with a cutting shoe on the lower end through the alluvial deposits down to bed rock; the purpose being to locate the gold bearing sand or gravel deposits, the depth or thickness of the deposits, the area covered and the average gold content per cubic yard. When a hole is finished and the prospect has been made the casing is pulled as it can be used over and over again. As a rule drill holes of this character are not very deep and the casing can usually be easily removed but where the alluvial deposits are fairly deep, for instance one hundred feet, or so, the casing often sticks and is removed with great difficulty, if at all. Different methods of pulling a casing are employed. In one method a knocking head is attached to the upper end of the casing and a pipe jar is connected with a drill stem in place of a bit. The walking beam to which the drill rope and jarring tools is attached is the seat of operation and the up and down movement is utilized to drive or jar the casing loose, the jar or striking blow being in an upward direction.

Another method employed is that of using a spear. This is dropped down into the casing toward the lower end and thereby expanded to grip the casing. A string of jarring tools are interposed between the spear and the drill rope and when the walking beam is set in operation an upward blow or jar is obtained to free and pull the casing.

There are objections to both methods. When a knocking head is employed a constant jar tends to strip the threads in the casing couplings; also, in view of the fact that the length of casing sections employed is usually uniform the same or a similar length of drill rope will receive all the strain, wear and tear.

When a spear and jarring tools are employed there is a tendency to swell or expand the casing at the point where the spear is attached and if that happens the casing is ruined. Also, if the drill rope should break the rope will fall down into the casing and thereby necessitates a fishing operation.

The main objection to either method is that the entire weight of the casing and the force required to jar it loose is transferred through the

drill rope to the rig and the mechanism actuating the same subjecting it to unnecessary wear and tear.

The object of the present invention is to generally improve and simplify the construction and operation of tools of the character described; to provide a method and apparatus for removing a casing whereby the only strain transmitted to the rope, the rig and the mechanism actuating the same is limited to that required to lift the weight of the rope and tools attached thereto; to provide hydraulic means for transmitting a constant lift or pull on the casing; to provide a resilient lifting member between the jacks and the casing which is adapted to be sprung or tensioned by means of the jacks; and further, to provide a resilient lifting member which may be subjected to a jarring action to loosen or free the casing.

The invention is shown by way of illustration in the accompanying drawings, in which—

Fig. 1 is a side elevation of the forward end of a portable drill rig, said view also showing the manner in which the jacks and resilient lifting member are applied to the casing to pull the same.

Fig. 2 is a plan view of Fig. 1, and

Fig. 3 is a front view showing the jacks and the resilient lifting mechanism applied to the casing.

Referring to the drawings in detail, A indicates a test casing, such as employed when prospecting mineralized areas, etc., 2 indicates the type of coupling employed for coupling the casing sections, 3 a pulling head to secure and grip the casing as it is being lifted, and 4 a standard form of driving head. The pulling head is, in this instance, shown as supported by a pair of timbers 5—5 of considerable length. These timbers are spread apart a sufficient distance to straddle the casing and their outer ends are supported by cross timbers 6—6 and these are, in turn, supported by hydraulic jacks of suitable construction generally indicated at 7—7.

Mounted on the drill rig is a plunger pump 9 which may be operated by an eccentric 10, or any other suitable means. The pump is provided with a check valve controlled inlet 11 and a check valve controlled outlet or discharge 12. The inlet check is connected through a pipe 14 with a supply tank 15, and the outlet or discharge check is connected with pipes 16, 17 and 18. Pipe 16 is connected by means of a pair of flexible hose lines 19 and 20 with

the respective jacks, indicated at 7, and valves 21 are placed on these lines to regulate the flow of fluid to the jacks. Pipe 18 functions as a return to the tank 15. Pipe 17 carries a relief valve 22 which may be regulated to maintain any pressure desired. The relief valve connects with a return 18 and if oil or any other fluid medium employed is being by-passed it will be returned to the tank. A valve 23 is placed at the point shown. This valve is normally closed when the jacks are being elevated but it is opened when the jacks are to be lowered, as will hereinafter be described.

In actual operation when a test hole has been completed, that is, when the casing shoe reaches bed rock and the prospecting of the material contained therein has been completed, it is desirable to remove the casing so that it may be utilized for another test hole. In the present instance this is accomplished by placing a standard form of pull head 3 at the upper end of the casing, as shown in Fig. 1, and by supporting the pull head through means of the timbers indicated at 5-5, 6-6 and the jacks 7-7. A driving head is placed on the extreme upper end of the casing and a driving clamp is attached to the drill stem as indicated at 25. After the casing is free it is only necessary to start the pump and to direct the oil or other fluid medium contained in the tank 15 through the hose connections 19 and 20 to the respective jacks. These will raise and as they raise they will elevate the timbers and the pull head 3, together with the casing A gripped by the same, and when the jacks have reached the limit of their stroke it is only necessary to open the valve 23 so as to permit the pistons and the jacks to return to their lowermost position, this being accomplished automatically as the weight of the timbers and the pull head is sufficient for that purpose. The moment the pull head and pistons reach their lowermost position valve 23 is again closed and fluid under pressure is thus again admitted to the jacks to again lift or pull the casing. This operation is continued until the lower end of the first casing section is reached. This is then unscrewed and so is the coupling and the drive head 4 is removed and replaced on the end of the next casing section. This operation is continued as long as the casing is free and can be readily lifted with the jacks but if it sticks or jams it is only necessary to start the walking beam so as to impart a reciprocal motion to the drill rope and the tools attached thereto. The jacks will under this condition exert their maximum pressure at the ends of the timbers 5 and as they are of considerable length, as shown in Fig. 3, there will be a tendency to spring them as indicated by dotted lines. This bending or springing of the timbers will cause a pull or lift to be imparted to the casing and if the casing is at the same time struck or jarred by the driving clamp there will be a tendency to jar the casing loose and to lift or pull it in an upward direction.

The interposing of the flexible or resilient timbers or lifting members between the jacks and the pull head 3 is of great importance as it permits a continuous pull or lift to be applied to the casing and at the same time permits the casing to be subjected to hammer or jarring action so as to jar it loose. This method has been found very effective in actual practice and by its use

objectionable wear and tear on the rig and tools as a whole is substantially eliminated. That is, the drill rope will at no time be subjected to excessive pulls and strains as the work involved will merely be that of supporting the weight of the jarring tools attached thereto, and as this is the case the drill rig and the mechanism actuated by the same cannot be overloaded or subjected to abuse. Excessive wear of the drill cable is avoided. The constant changing of tools is avoided; that is, when driving a casing the tools employed are a drill bit and a drill stem. When the material at the bottom has been drilled out a sand pump or the like is lowered and the freed material removed, thereafter the driving clamp is attached to the drill stem and the casing driven down a little further. The clamp is then removed and the bit lowered down to drilling position and when the hole is finally completed it is unnecessary to change the tools when pulling the casing as the only part of the tools employed is the driving clamp which can be quickly attached or removed as required.

While the casing pulling mechanism has been described in conjunction with the pulling of a casing, it is obvious that it may be employed for pulling drill pipe and for any other similar purposes, and while certain features of the invention are more or less specifically described, I wish it understood that various changes may be resorted to within the scope of the appended claims. Similarly, that the materials and finish of the several parts employed may be such as the manufacturer may decide, or varying conditions or uses may demand.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. A method of releasing and pulling casing of the character described which consists in attaching a resilient member to the casing, applying a lifting force to the casing through the resilient member, and subjecting the casing to a jarring action while a lifting force is being exerted.

2. A method of releasing and pulling a casing of the character described which consists in attaching an elongated resilient member to the casing midway of its ends, applying a lifting force to the opposite ends of the resilient member, and subjecting the casing to a jarring action while a lifting force is being exerted.

3. A device for releasing and pulling casing comprising a pair of lifting jacks adapted to be disposed one on each side of the casing, a resilient member straddling the casing and supported at opposite ends by the jacks, said resilient member being engageable with a pulling head on the casing, and means for actuating the jacks to impart an upward thrust on the resilient member and the pulling head.

4. A device for releasing and pulling casing comprising a pair of lifting jacks adapted to be disposed one on each side of the casing, a cross timber supported by each lifting jack, a pair of elongated timbers placed one on each side of the casing and supported at opposite ends by the cross timbers and the respective lifting jacks, said elongated timbers engaging a pulling head on the casing midway of their length, and means for actuating the jacks to impart an upward thrust on the elongated timbers and the pulling head engaged thereby.

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