Sept. 6, 1927. 1,641,189

G. A. MONTGOMERY

TEMPER SCREW

Filed April 11, 1924 2 Sheets-Sheet 1

Fig. 1.

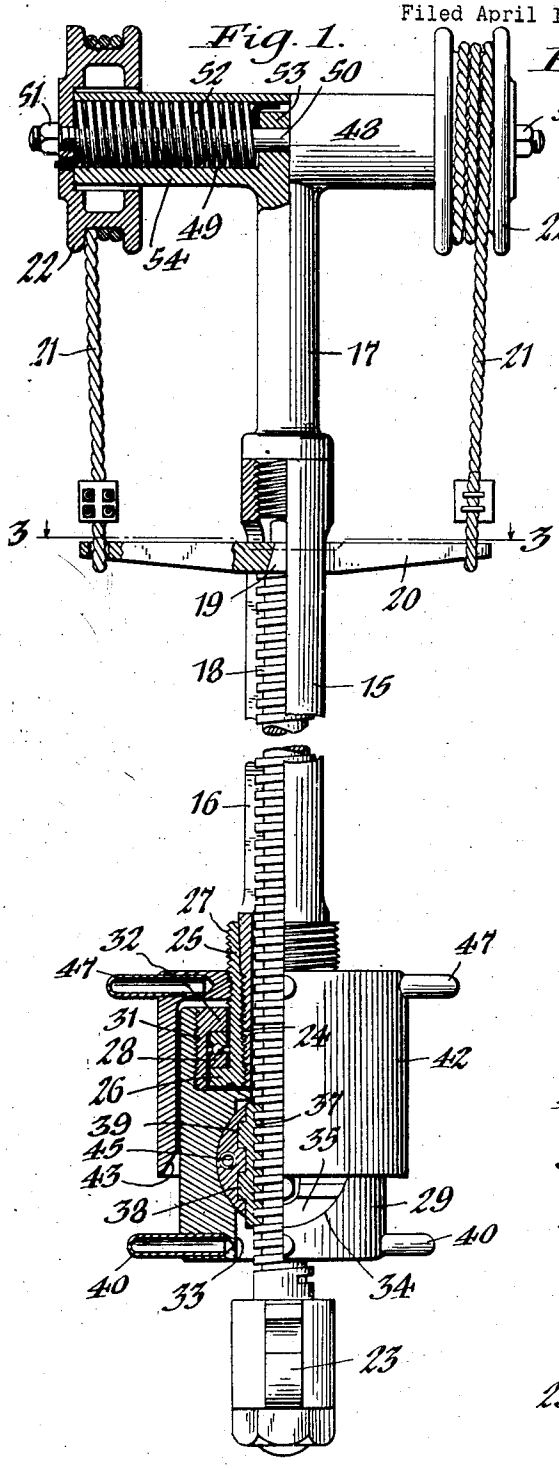
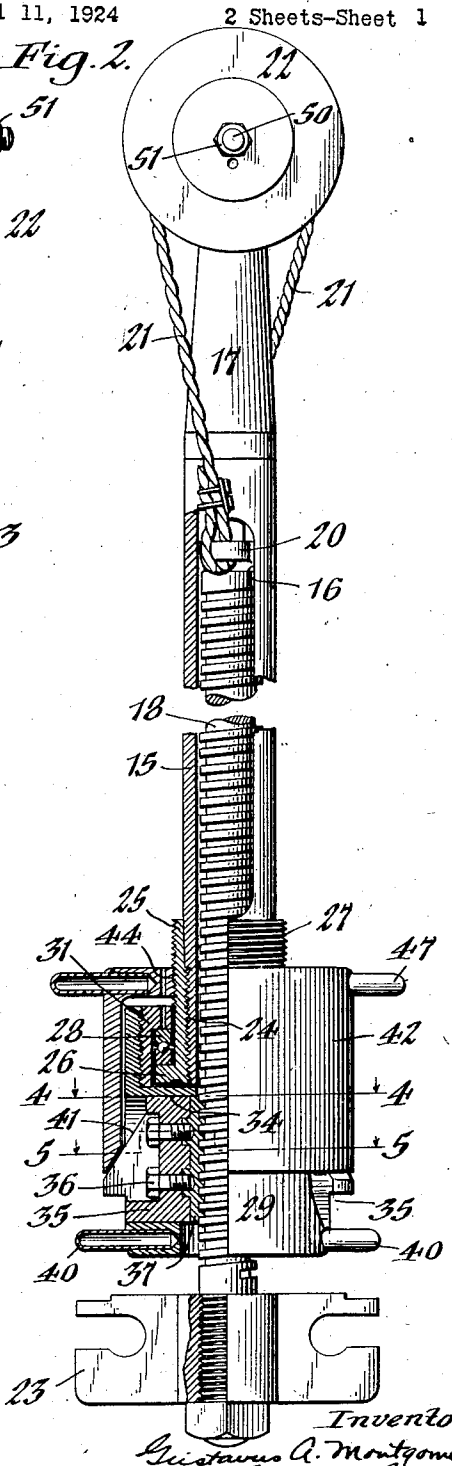


Fig. 2.



Inventor;
Gustavus A. Montgomery,
by Geyer & Geyer
Attorneys.

Sept. 6, 1927. 1,641,189

G. A. MONTGOMERY

TEMPER SCREW

Filed April 11, 1924 2 Sheets-Sheet 2

Fig. 3.

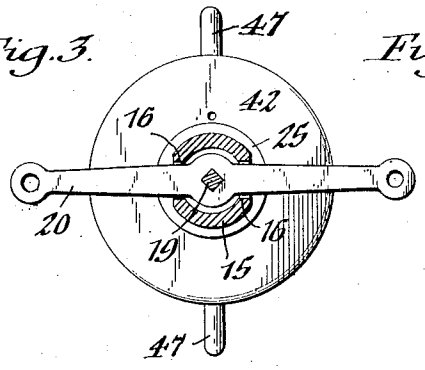


Fig. 4.

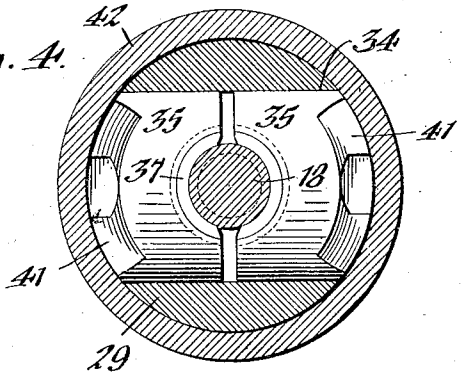


Fig. 5.

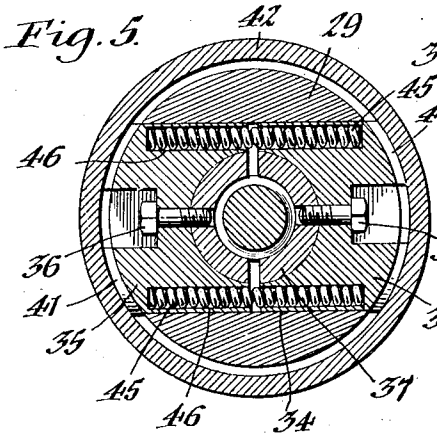


Fig. 6.

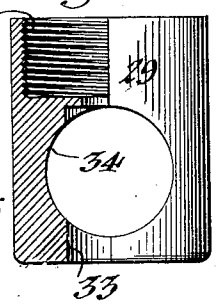


Fig. 7.

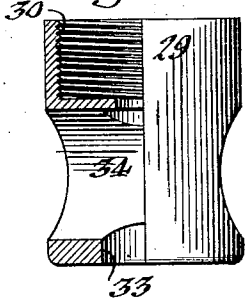


Fig. 8.

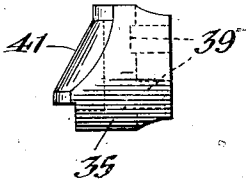


Fig. 9.

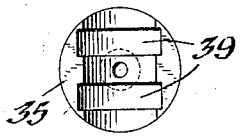


Fig. 10.

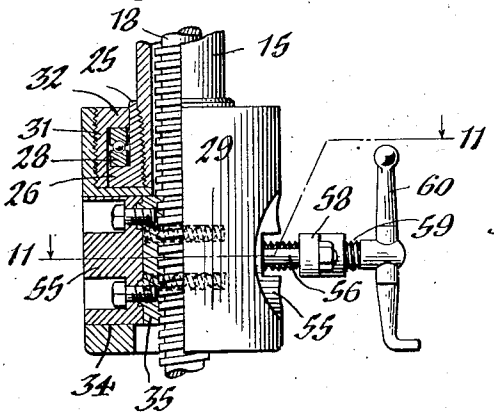
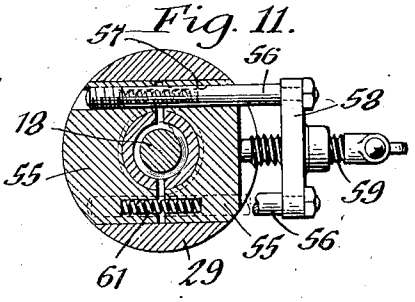


Fig. 11.



Inventor,
Gustavus A. Montgomery,
by Geyer & Geyer
Attorneys.

Patented Sept. 6, 1927. 1,641,189

UNITED STATES PATENT OFFICE.

GUSTAVUS A. MONTGOMERY, OF TITUSVILLE, PENNSYLVANIA, ASSIGNOR TO TITUSVILLE FORGE COMPANY, OF TITUSVILLE, PENNSYLVANIA, A CORPORATION OF MARYLAND.

TEMPER SCREW.

Application filed April 11, 1924. Serial No. 705,905.

This invention relates to improvements in the temper screws employed in connection with well drilling apparatus.

One of its objects is to provide a non-rotatable temper screw with novel means for effecting the raising and lowering thereof.

Another object of the invention is to provide the screw-operating mechanism with simple and reliable means for adjusting it relative to the screw.

A further object is the provision of efficient means for automatically returning the screw to its elevated position when the screw-operating mechanism is disengaged therefrom.

In the accompanying drawings:

Figure 1 is a sectional front view of the improved temper screw. Figure 2 is a sectional side view thereof. Figure 3 is a horizontal section on line 3—3, Fig. 1. Figures 4 and 5 are enlarged horizontal sections on the correspondingly numbered lines in Fig. 2. Figure 6 is a sectional elevation of the nut-slide carrying sleeve. Figure 7 is a similar view taken at right angles thereto. Figure 8 is a side view of one of the nut-slides. Figure 9 is an inside face view thereof. Figure 10 is a fragmentary sectional front view of a modified form of the invention. Figure 11 is a horizontal section on line 11—11, Fig. 10.

Similar characters of reference indicate corresponding parts throughout the several views.

The casing which supports the working parts of the temper screw is preferably in the form of a tube 15 provided in its diametrically opposite sides with longitudinal slots or guideways 16 terminating short of either end thereof. Secured to the upper end of this tube is a hanger in the form of a T-head 17 which is attached to the usual walking beam, not shown, of the drilling apparatus.

18 indicates the temper screw proper which extends through the tube and is provided at its upper end with a square neck or shank 19 to which an elevator cross bar 20 is securely fastened, the latter extending through the slots of the tube. This elevator cross bar functions to guide the screw lengthwise of the tube and also prevents its rotation during the step-by-step movement of the screw as the drilling operations are performed. The screw is suspended from the elevator bar by cables 21 connected at their lower ends to the opposite ends of said bar, while their upper ends pass around and are suitably secured to guide pulleys 22 journaled on the opposite ends of the T-head 17. Attached to the lower end of the screw is a cross-head 23 from the ends of which the customary cable-clamps, not shown, are suspended.

The preferred means for accomplishing the step-by-step movement of the screw to gradually lengthen the stroke of the drilling tools as the drilling operation proceeds, so that the bit will strike the bottom of the well on each down stroke, is shown in Figs. 1–9, inclusive, and constructed as follows:

At its lower end the supporting tube 15 is provided with a tapered external thread 24 with which a sleeve 25 is connected, the latter terminating at its lower end in an annular external flange 26, while its upper end is provided at a suitable distance above said flange with an external screw-threaded portion 27. The flange 26 of this sleeve forms a support for a thrust bearing 28 upon which a pendant rotatable head 29 is swiveled. The upper end of this rotatable head is provided with an upwardly-opening threaded socket 30 for receiving a cap or collar 31 having an annular internal flange 32 at its upper end which engages the upper side of the thrust bearing, as shown in Figs. 1 and 2. By thus suspending the rotatable head, it is free to turn or swivel on the tube-sleeve 25 but is held against longitudinal movement relative thereto and to the screw. Said head is provided below its socket with a counter bore 33 which passes freely over the temper screw proper. Below its socket, this head has a transverse bore 34 extending from side to side thereof in which is mounted a pair of opposing slides 35 guided for movement toward and from the temper screw. As shown in Figs. 1, 8 and 9, these slides are of circular cross section and their inner faces are flat. Detachably secured to the inner faces of these slides, by bolts 36 or other appropriate fastenings, are substantially semi-cylindrical liners 37 threaded on their inner sides to engage the screw, these liners constituting a split nut which practically embraces the temper screw when the slides are in their operative contracted position.

To prevent vertical displacement of the liners relative to their slides, the same are

provided on their outer sides and near their upper and lower ends with flanges 38 which engage semi-circular grooves 39 in the opposing flat faces of the slides. The rotatable head 29 may be provided near its lower end with radially-projecting handles 40 for facilitating the turning thereof during the act of raising and lowering the screw.

By this construction and arrangement of the screw-operating mechanism, the screw 18 is held against turning when the head 29 is rotated in one direction or the other to effect a corresponding raising or lowering of the screw, thereby preventing twisting or untwisting of the tool-suspending cable and eliminating the use of the swivels such as are necessarily employed at the present time at the upper and lower end of the screw.

Means are provided for readily effecting the movement of the liner slides 35 to disengage them from the screw when it is desired to elevate the latter to its normal position, shown in Figs. 1 and 2. For this purpose, the outer ends of the slides are provided with tapered bearing surfaces 41, which project beyond the slide-carrying head 28 and with which the lower end of an adjustable bell-cap 42, having a correspondingly-beveled inner surface 43, is adapted to engage. This bell cap is rotatable relatively to the slide-carrying head and is provided in its top with a threaded opening 44 which engages the externally-threaded portion 27 of the flanged-sleeve 25 secured to the lower end of the supporting tube. Coil springs 45 mounted in opposing recesses 46 in these slides tend constantly to urge them outwardly out of engagement with the screw and to bring their beveled surfaces into contact with the corresponding surfaces of the bell cap, the latter limiting the lateral movement of these slides and also preventing their displacement. At its upper end, the bell cap is provided with radial handles 47 for turning it. When this cap is turned in the direction to raise it, the slides automatically expand and are disengaged from the screw, permitting the latter to be lifted to its normal elevated position. When the cap is turned in the reverse direction to lower it, the slides are gradually moved inwardly and their threaded-liners 37 are brought into engagement with the screw. In turning the slide-carrying head relative to the bell cap, and vice versa, one of such relatively movable members is held with one hand while the other is turned with the other hand. By screwing down tightly on the bell cap, the temper screw and its actuating head may be positively held in a set position and locked against accidental movement.

Means are provided for automatically returning the temper screw to its normal elevated position when the same has been partially or fully lowered relative to the screw operating mechanism. In the preferred embodiment of this feature of the invention shown in Figs. 1 and 2, the horizontal portion 48 of the T-head 17 is provided with a horizontal bore 49 through which a tie-bolt 50 extends, the nuts 51 of this bolt preventing displacement of the guide-pulleys 22. Surrounding this bolt and confined in the bore of this T-head are tortional springs 52 which act as a counterbalance for the screw and which tend constantly to turn the guide pulleys in the proper direction to elevate the screw, each spring being connected at one end to its companion pulley and at its other end to a central partition 53 extending into the bore, or to any other fixed part of the T-head. To prolong the life of this T-head, its bore is arranged eccentric to the axis thereof, so as to provide a thickened lower wall 54 which engages the customary bearing openings in the walking beam.

Briefly stated, the operation of this apparatus is as follows:

In the position of the parts shown in the drawings, the screw 17 is in its elevated position and the slides 35 are in their contracted position with the threaded-liners 37 in operative engagement with the screw. To lower the screw for the purpose of gradually increasing the stroke of the drilling tools as the drilling operation proceeds, the slide-carrying head 29 is turned in the proper direction relatively to the bell-cap 42 in the manner heretofore described. This operation results in the screw being moved longitudinally of its guide tube 15 without turning. When the screw reaches the end of its lowest position, the bell-cap is turned in the proper direction relatively to the rotatable head to allow the slides to be released from engagement with the temper screw, after which the latter is automatically lifted to its initial position by the spring-suspension mechanism, including the springs 51, pulleys 22, cables 21, and elevator-bar 20. While in this position, the liner-slides are again brought into engagement with the screw and the drilling operations are repeated.

Figs. 10 and 11 show a modified construction for adjusting the liner-slides into and out of engagement with the screw. In this case, the bell-cap 42 is dispensed with and the slides 55 are free from tapered extensions. Instead, parallel, horizontal rods 56 are provided which are connected at their inner ends to one of the slides and freely pass through alining openings 57 in the companion slide. Connecting the free ends of these rods is a yoke 58 carrying between its ends an adjusting screw 59 disposed parallel with said rods and normally abutting at its inner end against the outer face of the slide containing the rod-receiving openings. The

outer end of this adjusting screw may be provided with a suitable handle 60. As in the preferred construction, the slides 55 contain coil springs 61 which act to normally separate them. By turning the adjusting screw 59 in one direction, the liner-sections are contracted and brought into engagement with the temper screw 18, and when turned in the reverse direction, the coil springs 61 act to separate the slides to disengage them from the temper screw.

This improved temper screw is comparatively simple in construction, reliable and efficient in operation, and its parts can be readily replaced when worn.

I claim as my invention:

1. In a device of the character described, a temper screw, a casing in which said screw is guided for movement lengthwise thereof, two relatively rotatable members arranged at the lower end of said casing, one of said members being held against movement axially of the screw and the other being free to move axially thereof, and an internally-threaded element carried by said first-named rotatable member for movement into and out of engagement with said screw, said second-named rotatable member being arranged to control the movements of said screw-threaded element.

2. In a device of the character described, a temper screw, a casing in which said screw is guided for movement lengthwise thereof, means for holding said screw against rotation, a rotatable head swiveled on said casing, a slide movable laterally of said head and having a threaded-liner arranged to engage said screw, and a second rotatable head mounted on said casing and adjustable lengthwise thereof, a portion of said second head extending over the first-named head and engageable with said slide for controlling its movement into and out of engagement with said screw.

3. In a device of the character described, a temper screw, a casing in which said screw is guided for movement lengthwise thereof, means for holding said screw against rotation, a rotatable head swiveled on said casing, an internally-threaded member slidably mounted in said head and movable laterally into and out of engagement with said screw, the outer end of said member normally projecting beyond said rotatable head, means tending constantly to move said member in a direction away from the screw, and rotatable means adjustable lengthwise of said casing and arranged to engage the outer end of said threaded member for moving it in a direction toward said screw.

4. In a device of the character described, a temper screw, a casing in which said screw is guided for movement lengthwise thereof, means for holding said screw against rotation, a rotatable head swiveled on said casing and containing a transverse bore, slides movably arranged in said bore on opposite sides of said screw for operative engagement therewith, yieldable means arranged between the opposing sides of said slides for normally moving them in a direction away from the screw, and adjustable means applied to the casing and extending over said rotatable head to turn relatively thereto, said means being adjustable lengthwise of the casing for moving said slides in a direction toward said screw.

5. In a device of the character described, a temper screw, a casing in which said screw is guided for movement lengthwise thereof, means for holding said screw against rotation, a rotatable head swiveled on the lower end of said casing, the latter having an externally-threaded portion above said head, a screw-engaging member guided for lateral movement on said head for engagement with said screw, the outer end of said member extending beyond said head, and an adjustable cap traveling on the threaded portion of said casing and arranged over said head for engaging the extended end of said threaded member.

6. In a device of the character described, a temper screw, a casing in which said screw is guided for movement lengthwise thereof, means for holding said screw against rotation, said casing having a bearing flange at its lower end, a head suspended from said flange exterior of the casing and rotatable thereon but held against movement axially of the screw, and screw-engaging means slidably mounted in said head and movable into and out of engagement with said screw, and an adjustable cap mounted on the lower end of said casing above its flange and arranged over said head for engagement with the screw-engaging means for controlling the movements thereof.

7. In a device of the character described, a temper screw, a casing in which said screw is guided for movement lengthwise thereof, means for holding said screw against rotation, a rotatable head suspended from the lower end of said casing, the opposing ends of the latter and said head having oppositely extending flanged portions separated by a ball bearing, screw-engaging means carried by said head and movable into and out of engagement with said screw, and rotatable means extending over said head and arranged for engagement with said screw-engaging means for controlling the movements thereof.

8. In a device of the character described, a temper screw, a casing for said screw having longitudinal slots in its opposite sides, an elevator bar secured to the upper end of the temper screw and extending through said casing slots, a T-head applied to the

upper end of said casing, means carried by the casing and engaging said screw for actuating it at will, pulleys arranged on the opposite ends of said T-head, cables connecting the pulleys with said elevator bar, and means contained in said T-head and connected with said pulleys for yieldingly resisting their rotation in one direction.

9. In a device of the character described, a temper screw, a casing in which said screw is guided for movement lengthwise thereof, said casing having a supporting member at its upper end provided with a transverse bore, means carried by said casing and releasably engaging said screw for actuating it at will, a pulley journaled on said supporting member, and a torsional spring arranged in said bore and connected to said pulley for moving the same in a direction to elevate said screw.

GUSTAVUS A. MONTGOMERY.