Jan. 26, 1926. 1,570,756

M. H. MAGIE

TOOL FEEDING MEANS FOR DRILLING RIGS

Filed Feb. 18, 1922 2 Sheets-Sheet 1

Fig. 1.

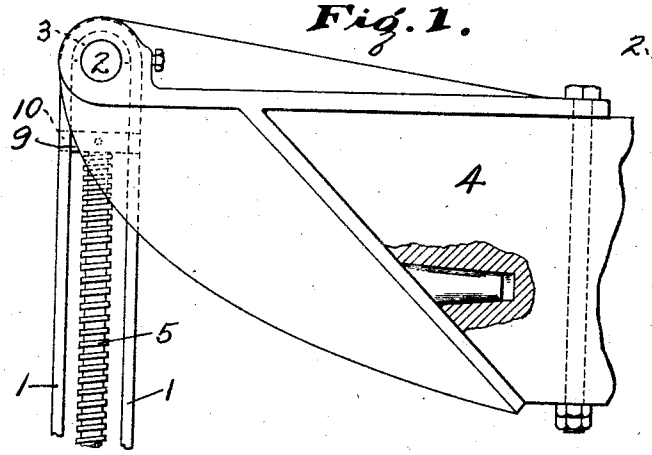
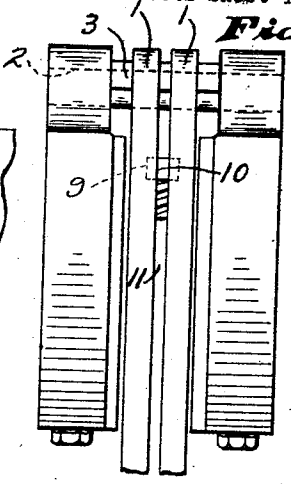


Fig. 2.



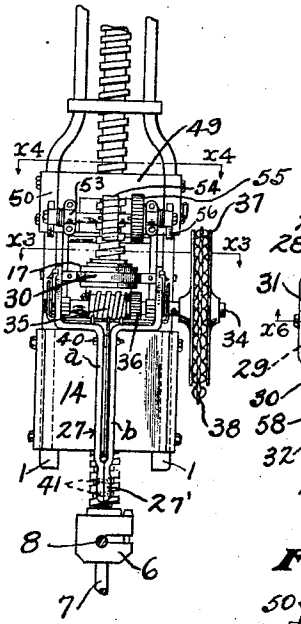


Fig. 3.

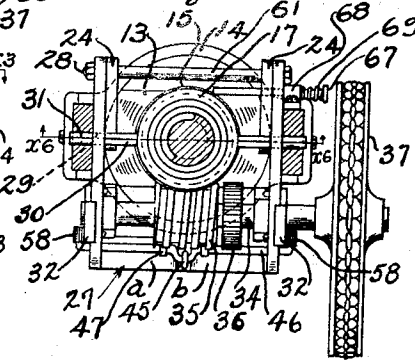
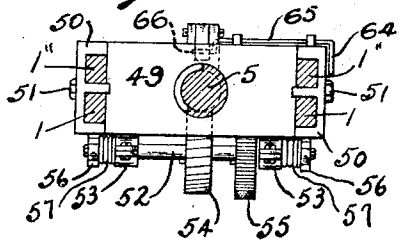
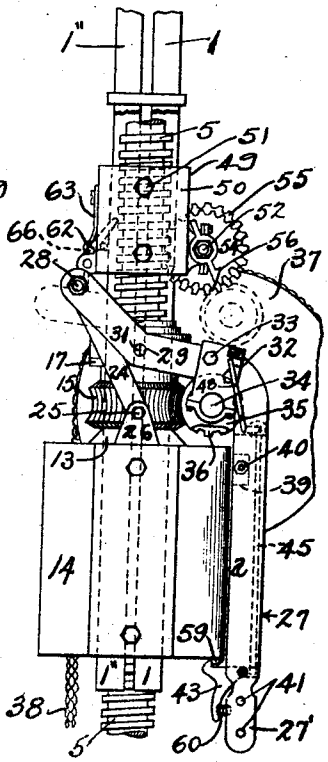


Fig. 4.





Inventor :

MORTON HOMER MAGIE

Witness:
Arthur T. Larrabee

James R. Townsend
his Atty.

Jan. 26, 1926. 1,570,756

M. H. MAGIE

TOOL FEEDING MEANS FOR DRILLING RIGS

Filed Feb. 18, 1922 2 Sheets-Sheet 2

Fig. 5.

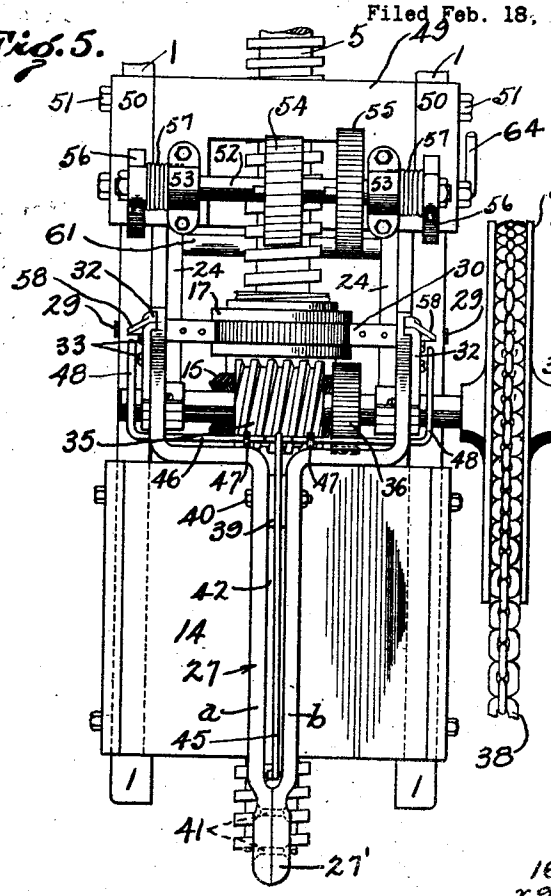


Fig. 8.

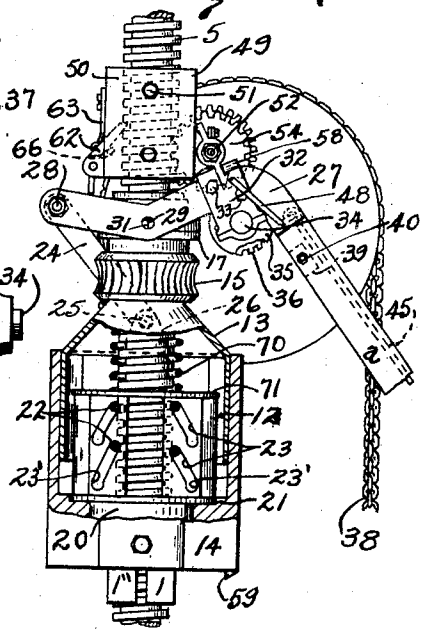


Fig. 6.

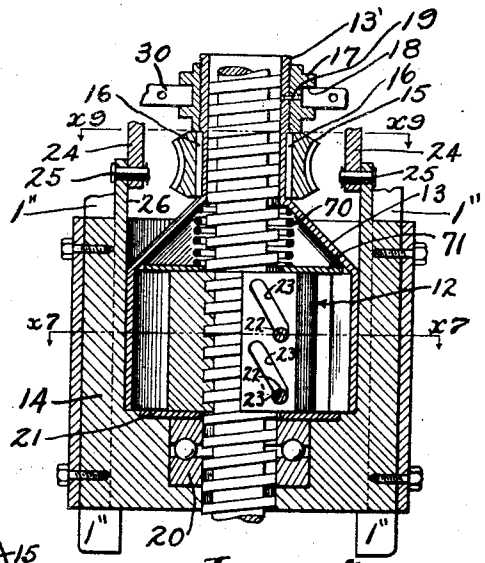


Fig. 7.

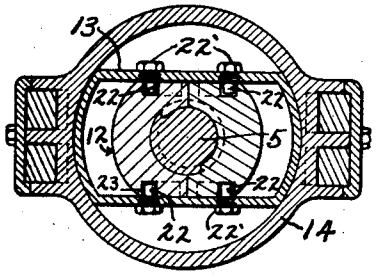
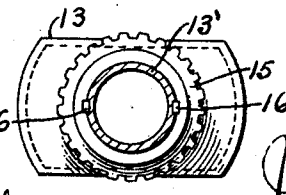


Fig. 9.



Witness:
Arthur D. Larrabee

Inventor:
Morton Homer Magie
by James R. Townsend
his atty.

Patented Jan. 26, 1926. 1,570,756

UNITED STATES PATENT OFFICE.

MORTON HOMER MAGIE, OF LOS ANGELES, CALIFORNIA.

TOOL-FEEDING MEANS FOR DRILLING RIGS.

Application filed February 18, 1922. Serial No. 537,412.

To all whom it may concern:

Be it known that I, MORTON HOMER MAGIE, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Tool-Feeding Means for Drilling Rigs, of which the following is a specification.

This invention relates to improvements in a form of tool feeding means for drilling rigs, set forth in my application Serial No. 514,940, filed November 14, 1921, and involves improvements in which the drilling line is operated by a chain-driven rack and pinion arrangement.

An object of this invention is to provide better means whereby the temper screw of a drilling rig may be rapidly raised or lowered to a predetermined point.

An object is to enable an operator to easily raise and lower the temper screw.

Another object of this invention is to provide improved means whereby the temper screw may be raised or lowered at a slow, or a rapid rate of speed as desired.

An object is to provide more durable means to quickly raise and lower and to centrally carry well drilling tools, so as to avoid any wear due to side strains present in previous constructions.

Other objects are simplicity and cheapness, and cheaper installation costs.

The invention comprises, in combination with a non-rotatable temper screw, of high speed and low speed mechanism for raising and lowering the screw, and means for alternately connecting the low speed mechanism with, and disconnecting the high speed mechanism from, the screw, and vice versa, so as to raise or lower the screw rapidly or slowly according as occasion requires.

An object is easy shifting from low speed to high speed, and vice versa.

Other objects, advantages and features of invention may appear from the accompanying drawings, the subjoined detail description and the appended claims.

The invention may be constructed in various forms and may be applied with the yoke commonly used for carrying a drilling line clamp with two suspending links but is preferably applied with a single bail support.

The accompanying drawings illustrate the invention in the preferred form.

Figure 1 is a fragmental elevation showing a device constructed in accordance with this invention in which the temper screw is suspended from the end of a walking beam, a portion of which is shown.

Fig. 2 is a fragmental front elevation on a larger scale, of the mechanism shown in Fig. 1, and showing more or less diagrammatically in dotted lines the gear and pinion in engagement for rapidly raising and lowering the temper screw. Parts are broken away and the clamp and bail are omitted to contract the view. Part of the reins are omitted for clearness. The walking beam and reins are on the same scale as Fig. 1.

Fig. 3 is a horizontal section on line x^3, Fig. 1.

Fig. 4 is a horizontal section on line x^4, Fig. 1, parts being omitted for clearness.

Fig. 5 is a fragmental side elevation showing the operating mechanism on a larger scale than that of Figs. 1, 2, 3, and 4.

Fig. 6 is a sectional view on a plane indicated by line x^6, Fig. 3, one half of the split nut being shown in elevation.

Fig. 7 is a section on line x^7, Fig. 6.

Fig. 8 is a fragmental elevation partly in section on the same scale as Figs. 2, 3, and 4 and shows the parts in position for rapid raising and lowering of the temper screw. The split nut is spread to release the temper screw.

Fig. 9 is a view in section on line x^9, Fig. 6, showing the connection between the worm gear and the nut opening, closing, and revolving shell.

Figs. 2, 3, 4 and 8 are on the same scale.

Figs. 5, 6, 7 and 9 are on the same scale.

The reins 1 and 1″ are journaled on a top bearing 2 that may be variously constructed and is shown as a shaft upon which a box 3 is journaled. The shaft 2 is secured to the walking beam 4 of a well drilling apparatus. The reins are arranged in pairs spaced apart on the box and form between them a vertical way 11.

The temper screw 5 forms a vertically movable bail support and is provided at its lower end with a centrally arranged bail bearing 6 from which is hung a single bail 7, shown fragmentally, and having a central

bearing 8 to rest on said bail bearing. The usual clamp, not shown, may be attached to the bail 7 for suspending the tools in a well.

The upper end of the temper screw 5 is non-rotatably fixed to a guide block 9 slidably and non-rotatably mounted to move vertically in said way 11. Lugs 10 on said guide block are adapted to slidably fit in the way 11 between the pairs of reins 1, 1''. The lugs 10 prevent the guide block 9 and temper screw 5 from turning and springing out of vertical alinement.

The temper screw 5 is alternatively suspended from the reins by means of a pinion 54 and a split nut 12, and connections; and said nut is mounted in a shell 13 that has flattened sides adapted to both guide and to turn the nut sections, that are arranged to slide toward and from each other between said sides. The shell 13 is rotatably mounted in a case 14 that is fixed to and supported by the reins 1, 1''.

The upper end of the shell 13 is contracted so as to form a neck 13', and a worm gear 15 is non-rotatably secured to said neck by means of the keys 16, so as to rise and fall and revolve with the shell. A shifting collar 17 having an annular groove 18 is threaded onto the upper part of the neck 13' and is locked thereon by a pin 19. The worm gear is adapted to rotate the shell 13 and to rise and fall relative to the case and to the split nut 12, the rotation of which nut is adapted to raise and lower the temper-screw when the nut is closed to engage therewith.

The case 14 is provided at its lower end with an antifriction thrust bearing 20 which supports a washer 21 and the split nut 12 resting upon said washer. Said nut is adapted to be held in engagement with, and to be disengaged from, the temper screw 5 by means of pins 22 that are shown as the terminals of dog-point cap-screws 22' which are threaded through the walls of the shell 13 and project into and slidably engage angular slots formed in the split nut 12. Each of the angular slots is formed with a straight inclined limb 23 that is upwardly aslant toward the cleft of the nut, and with a locking seat shown as a short vertical limb 23'. The pins and their respective slots coact to move the nut sections to and from, and to hold the split nut in, closed position. Each side of each of the nut sections is provided with two slots arranged one above the other, and with a pin for each slot, thus to allow the nut sections to be moved horizontally to and from each other without binding.

Links 24 are pivotally connected to the case 14 by means of coaxial pivots 25 and upward extensions 26 of the case, and to the upper end of shifting lever 27 by pivot 28 and serve as a shifting fulcrum for the bifurcated shifting lever 27 that is pivoted by coaxial supporting pivots 29 to a split shifting yoke 30 that is mounted in the annular groove 18 of the shifting collar 17 and serves as a support for the bent shifting lever 27 which is pivotally connected at 31 to the arms of said split shifting yoke 30. The lever is adapted to be manually operated for opening and closing the split nut and for adjusting the mechanism from slow to rapid operating position, and vice versa.

The pivotal terminals 31 of the shifting yoke 30 extend through the lever 27 into the vertical ways 11 between the reins 1, 1'' which serve as vertical guides to said shifting yoke and to the shell 13 when the mechanism is in operation under load and when it is being changed from slow to rapid operating position and vice versa, from rapid to slow.

Hangers 32 are secured to the forks of the shifting lever 27 by means of bolts 33 and a shaft 34 journaled in said hangers carries a worm 35 which meshes with the worm gear 15. Said shaft also carries a pinion 36 and a pulley or sprocket wheel 37 which is rotated by an endless chain 38 that depends nearly to the floor upon which the workman stands to operate the temper screw.

The lever 27 is formed of two complementary members *a* and *b*, which are held in spaced relation by means of the block 39, the bolt 40 and rivets 41 to form a way 42 between said members.

When the handle 27' of the lever 27 is pulled down, the shell 13 is forced downwardly by the split yoke, thus closing the split nut 12 which then engages the temper screw 5 and the worm gear also meshes with the worm.

The shifting lever 27 is held in nut closing and pinion disconnecting position by a thumb lever latch 43 that is pivotally mounted on the handle 27' of the lever 27. The thumb lever is connected by a rod 45 extending upwardly along the way 42 to operate a rock shaft 46 mounted in bearings 47 on the bent lever 27 and having arms 48 to release the means which hold the shifting lever in the rapid operating position indicated by dotted lines in Fig. 2.

A supporting member 49 inserted between the reins 1, 1'', and clamped thereto by means of the cap plates 50 and bolts 51, carries a shaft 52 that is journalled in bearings 53 on said member and has fixed thereto a pinion 54 which is in constant mesh with the temper screw 5. A gear 55 fixed to the shaft 52 is adapted to mesh with the pinion 36. The latch members 56 for supporting the shifting lever 27 in rapid operating position are mounted on the ends of the pinion carrying shaft 52 and are held in latching position by the coil springs 57.

Bosses 58 on the hangers 32 are arranged to be caught by the latch members 56 to retain the shifting lever in rapid operating position. The rock arms 48 are adapted and arranged to release the latch members 56 when the thumb latch lever is operated.

The several views, except Fig. 8, show the parts in position for slow raising and lowering of the temper screw when working under load.

When it is desired to raise or lower the temper screw under load, the parts being in the position shown in Figs. 1–7, the attendant will operate the endless chain 38 to cause the worm 35 to drive the worm gear 15, to rotate the shell 13 and the split nut 12 relative to the case 14; thus slowly and powerfully raising or lowering the temper screw 5, according to the direction in which the chain is operated.

When it is desired to raise or lower the temper screw rapidly, the attendant will grasp the handle 27′ of the lever 27 and will operate the latch 43 to disengage it from the lug 59. This operation moves the rod 45 upwardly when the latch is disengaged and will cause the ends 48 of the rod 46 to be moved toward the shaft 34. After the latch 43 is disengaged from the lug 59 and released by the operator, the spring 60 will will force the rod 45 downward so as to retract the rock arms 48 of the rod 46.

The lever 27 will then be swung upwardly on its pivotal connections 29 and 31 to bring the pinion 36 into engagement with the gear 55, as shown in Fig. 8.

This raising of the lever 27 simultaneously moves the shell 13 vertically through action of the shifting yoke 30 and the shifting collar 17 which is secured to the neck 13′ of the shell 13. When the shell is moved vertically up, the dog points 22 sliding upwardly in the angular slots formed in the split nut 12, cause each half of the split nut to slide outward horizontally so as to disengage the temper screw 5. The latch members will then engage the lugs 58 and hold the pinion 36 and gear 55 in engagement.

The fork ends of the shifting lever 27 are connected by a spacing rod 61 which relatively spaces said arms and serves as a pivot bearing, and when the lever is operated, said spacing rod will move outwardly and release the latch holding means comprising a spring actuated dog 62 which normally engages the turns of the temper screw and supports said screw to prevent any downward movement thereof during the shifting of the shell; or will move upwardly and automatically disengage the dog 62, according to the direction in which it is operated.

The spring 63 moves the dog 62 into engagement with the threads of the temper screw and prevents said screw from dropping down when the split nut is out of engagement. Rotation of the shaft 34 by means of the endless chain 38 will rotate the shaft 52 and pinion 54 which is in engagement with the temper screw 5.

When it is desired to rapidly lower the temper screw 5, the handle 64 of the rod 65 is turned so that the offset portion 66 which engages the underside of the dog 62, will lift said dog out of engagement with the thread of the temper screw 5. The temper screw can thus be run up or down rapidly by operating the sprocket chain.

To change from rapid elevating or lowering position to a working position under load it often occurs that the split nut will not be in position to properly engage the threads of the temper screw; and I provide a pin 67 adapted to engage the worm gear 15, and slidably mounted in a bearing 68 which is fixed to the reins 1, 1″ as shown in Fig. 3. A spring 69 encircles said pin 67 to keep it out of engagement with the worm gear 15 when not in use. In order to move the split nut into position to engage the threads of the temper screw, the pin 67 will be pressed inward to engage the teeth of the worm gear and rotate said gear and shell 13; which rotates the split nut 12. This operation is continued until the nut is properly positioned, to engage the temper screw threads.

Resilient means in the form of a spring 70 encircling the temper screw 5 and arranged between the shell 13 and the top of the nut 12 holds the nut down when the shell is raised; a washer 71 is interposed between the spring and nut and prevents the split nut sections from rising on the pins 22 and engaging the temper screw 5, when the nut should be in disengaged position.

In the foregoing description I have used the term "case" to indicate the nut supporting means and the term "shell" to indicate the nut shifting and rotating means, but it is understood that my invention is not confined to any specific form of means for performing the functions stated; and that I do not intend to limit my claim to the specific construction of the elements thus named, nor to the other elements described and claimed herein.

I claim:

1. The combination with a walking beam and a shaft thereon; of reins spaced apart to form a vertical guide and journaled on said shaft; a case fixed to and supported by said reins; a guide block slidably mounted in said reins and provided with lugs adapted to fit the space between said reins; a temper screw fixed to said guide block; and alternative slow and rapid means for raising and lowering said temper screw relative to the case.

2. Temper screw supporting and operat-

ing means comprising reins; a case fixed to and supported by said reins; a shell mounted in said case; a split nut mounted in said case and shell and adapted to engage a temper screw; and means adapted to rotate said shell and nut for the purpose specified.

3. A temper screw supporting and operating means comprising reins; a case fixed to and supported by said reins; a shell mounted in said case and having a contracted portion forming a neck, a nut in said shell and adapted to engage a temper screw; and means engaging the neck portions of the shell so as to rotate said shell and nut for the purpose specified.

4. A temper screw supporting and operating means comprising reins; a case fixed to and supported by said reins; a shell rotatably mounted in said case; a split nut in said shell and adapted to engage a temper screw; means adapted to rotate said shell and nut for the purpose specified; and means adapted to disengage said split nut from the temper screw.

5. The combination with a walking beam and a shaft thereon; of reins journaled on said shaft; a case fixed to said reins; a guide block slidingly mounted in said reins; a temper screw fixed to said guide block and adapted to support well drilling tools; a split nut in said case adapted to engage said temper screw; means for rotating said nut; and means for moving said nut out of engagement with said temper screw for the purpose specified.

6. In a well drilling rig having a walking beam and reins journaled thereto; a temper screw mounted for vertical movement in said reins; means for raising and lowering said temper screw comprising a supporting member fixed to said reins; a shaft journaled on said supporting member; a pinion on said shaft and which is in engagement with said temper screw; a split nut engaging said temper screw; and a single means for operating said split nut and pinion independently of each other and to disengage said split nut from said temper screw when the means are moved into position to operate the pinion.

7. Temper screw supporting and operating means comprising reins; a case fixed to said reins; a shell in said case; a split nut in said shell adapted to engage the temper screw; a lever pivotally mounted on said shell and case; and adapted to disengage said split nut from the temper screw; and means mounted on said lever to rotate said shell for the purpose specified.

8. The temper screw supporting and operating means comprising reins; a case fixed to and supported by said reins; a shell in said case; a split nut in said shell and adapted to engage a temper screw; means for rotating said shell and nut; and means whereby a vertical movement of said shell will disengage said split nut from the temper screw for the purpose specified.

9. The temper screw supporting and operating means comprising reins; a case fixed to and supported by said reins; a shell in said case; a split nut in said shell and adapted to engage a temper screw; means for rotating said shell and nut; means for moving said shell vertically, and means whereby vertical movement of said shell will disengage said split nut from the temper screw.

10. Well tool supporting and operating means comprising reins; a supporting member attached to said reins; a shaft journaled to said supporting member; a temper screw mounted for vertical movement in said reins; a pinion mounted on said shaft and engaging said temper screw; a split nut engaging said temper screw; means for rotating said split nut to raise and lower said temper screw; and means adapted to disengage said split nut from said temper screw and to engage said shaft so as to operate said pinion for the purpose specified and vice versa.

11. Temper screw supporting and operating means comprising reins; a split nut adapted to engage a temper screw; means for moving said split nut into and out of temper screw engaging position; and means to engage the temper screw to support said screw when the nut is not engaging the temper screw.

12. In a device of the character set forth having spaced apart reins; a guiding block having lugs adapted to fit the space between said reins; a temper screw fixed to said guiding block; a case fixed to said reins; a shell in said case; a split nut in said case adapted to engage said temper screw and provided with angular slots; means fixed to said shell and slidably engaging said slots; means for rotating said shell and nut for the purpose specified; and means for moving said shell vertically to disengage said nut from said temper screw and vice versa.

13. In a well drilling apparatus having a walking beam, a temper screw and reins; a case supported by said reins; a split nut in said case adapted to engage said temper screw; means to disengage said nut from said temper screw; and means for positioning said split nut to receive the threads of the temper screw when it is desired to engage the temper screw with the split nut.

14. Temper screw supporting and operating means comprising reins; a split nut adapted to engage a temper screw; means for moving said split nut into and out of temper screw engaging position; and means to support said temper screw to prevent downward movement thereof when the nut is not engaging said screw.

15. Temper screw supporting and operat-

ing means comprising reins; a split nut adapted to engage a temper screw; means for moving said split nut into and out of temper screw engaging position; latch means to support said temper screw to prevent downward movement thereof when the nut is disengaged from said screw; and means to release said latch means to lower the temper screw.

16. Temper screw supporting and operating means comprising reins; a split nut adapted to engage a temper screw; means for moving said split nut into and out of temper screw engaging position; latch means to support said temper screw to prevent downward movement thereof when the nut is disengaged from said screw; and means to release said latch means to lower the temper screw when the split nut is out engagement with the temper screw.

17. Temper screw supporting and operating means comprising reins; a case fixed to said reins; a temper screw adapted for vertical adjustment in said reins and case; a shell in said case; a split nut in said shell and adapted to be moved into and out of engagement with said temper screw; means for rotating said split nut; and means in said shell adapted to prevent the split nut from engaging said temper screw when the nut should be in disengaged position.

18. The combination with a temper screw; of a split nut adapted to engage the temper screw; a shell arranged to rotate the nut; a worm gear fixed to said shell; a worm adapted to mesh with said worm gear; means for rotating said worm; and unitary means for disengaging said nut from said temper screw and said worm from said worm gear.

19. The combination with a temper screw; of a split nut adapted to engage said temper screw; means to rotate said nut to powerfully raise and lower said temper screw; a pinion in constant engagement with said temper screw; means for disengaging said nut from said temper screw; and means for rotating said pinion to rapidly raise and lower said temper screw.

20. Temper screw supporting and operating means comprising reins; a split nut adapted to engage a temper screw; means for moving said split nut into and out of temper screw engaging position; latch means to support said temper screw to prevent downward movement thereof when the nut is disengaged from said screw; and means to automatically release said latch means when the split nut is moved from disengaging to engaging position.

21. Temper screw supporting and operating means comprising reins; a case fixed to said reins; a temper screw adapted for vertical adjustment in said reins and case; a shell in said case; a split nut in said shell and adapted to be moved into and out of engagement with said temper screw; means for rotating said split nut; and a spring encircling said screw and arranged between said shell and nut for the purpose specified.

22. Temper screw supporting and operating means comprising reins; a case fixed to said reins; a temper screw adapted for vertical adjustment in said reins and case; a shell in said case; a split nut in said shell and adapted to be moved into and out of engagement with said temper screw; means for rotating said split nut; and resilient means arranged between said shell and nut to hold the nut down when the shell is raised.

23. Well tool operating means, comprising a temper screw, a worm operated nut and a pinion adapted respectively to powerfully and to rapidly raise and lower the screw; and means under the control of the operator to alternatively operate the nut and pinion to lower and raise the temper screw with power and with speed.

24. Well tool operating means comprising a temper screw; a pinion in constant mesh with said temper screw; a split nut adapted to be disengaged from and engaged with said temper screw; and means for rotating said nut when engaged with said temper screw and for rotating said pinion when said nut is disengaged from said temper screw.

25. Well tool operating means comprising a temper screw; a nut and a pinion adapted respectively to powerfully and to rapidly raise and lower said screw; and manually controlled means to selectively operate the nut and pinion to raise and lower the temper screw.

26. Well tool operating means comprising a temper screw; a nut to slowly and powerfully, and a pinion to rapidly raise and lower the screw; and means under the control of the operator, adapted to selectively operate the nut and pinion for disengagement of the nut and the screw when said means are moved in position to operate the pinion, and for disengagement of the pinion and screw when the nut is moved into position to operate the screw.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 10th day of February, 1922.

MORTON HOMER MAGIE.