Sept. 8, 1931. J. W. MacCLATCHIE 1,822,444

CEMENTING HEAD

Filed Jan. 20, 1930

Fig. 1.

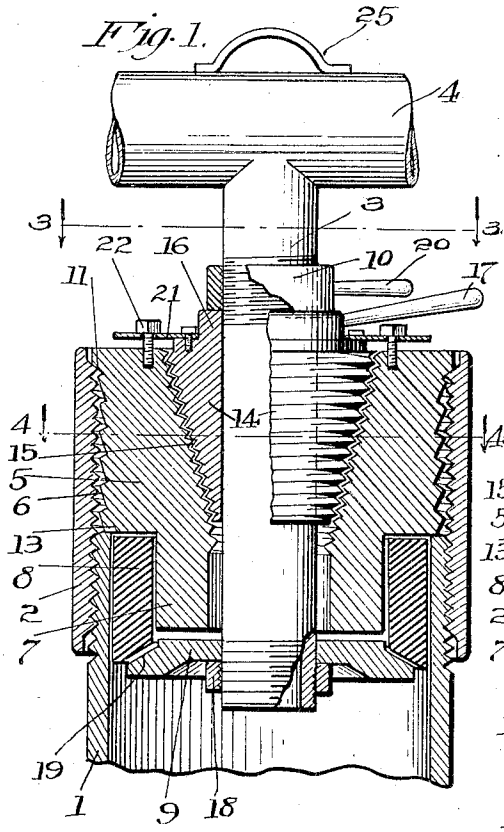


Fig. 2.

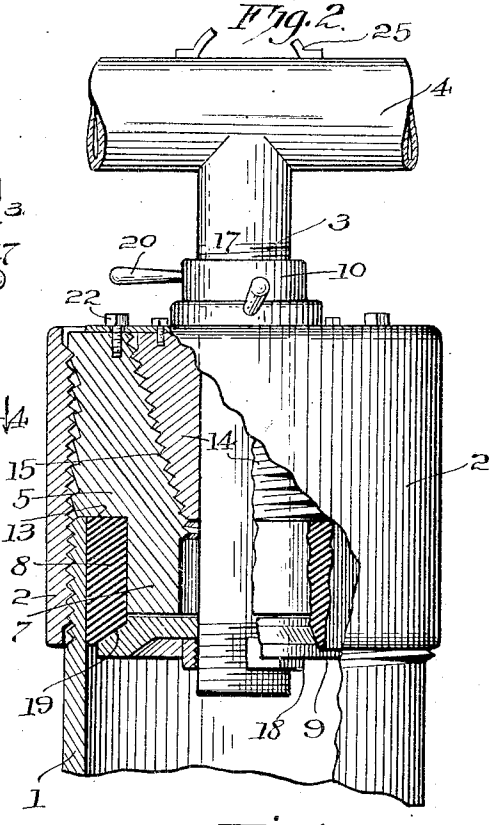


Fig. 3.

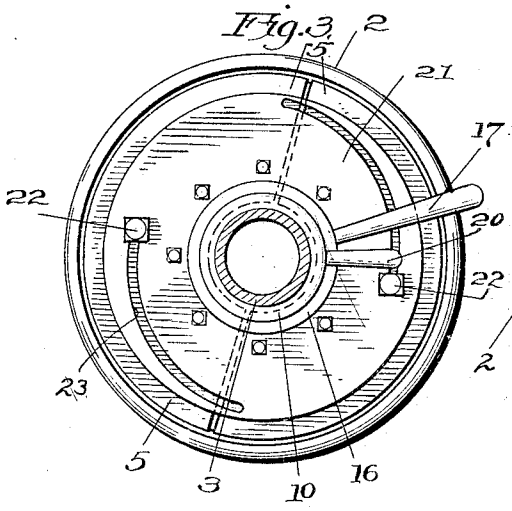
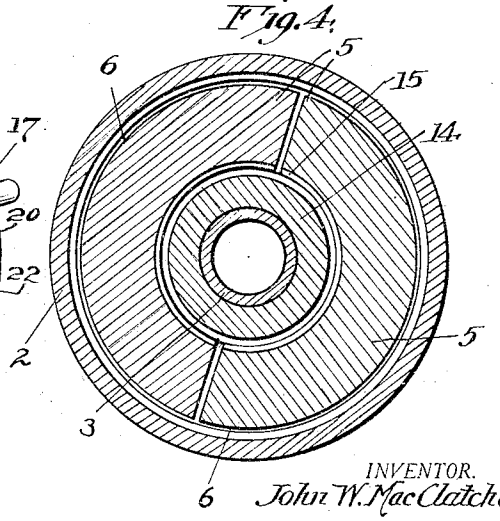


Fig. 4.



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CEMENTING HEAD

Application filed January 20, 1930. Serial No. 421,919.

This invention is a head for well casing, particularly applicable for cementing a well, and having means for positively locking and packing-off the head with relation to the well casing.

It is an object of the invention to provide slips for locking the head in the well casing, and to operatively expand the slips by a simplified and positive actuating means which will insure a binding engagement.

It is a further object of the invention to provide packing between the head and the well casing, and to preferably initiate operative expansion of the packing by the expansion of the slips, and to preferably provide positive means operating independently of the slip expanding means for further expanding the packing so as to insure a tight closure.

It is a still further object of the invention to adapt the packing for ready contraction and preferably provide simple but positive means for retracting the slips when the head is to be removed.

Further objects of the invention will be readily understood from the following description of the accompanying drawings, in which:

Fig. 1 is an axial section through the head showing it ready for locking engagement in a well casing.

Fig. 2 is a similar view, partly in side elevation, and showing the head locked in the well casing.

Figs. 3 and 4 are transverse sections on the lines 3—3 and 4—4 respectively of Fig. 1.

The head is adapted for mounting in the end of well casing 1, and preferably although not necessarily engages a usual internally threaded coupling collar 2 projecting upwardly from the end of the casing, with a pipe 3 for supplying cement and the like preferably extending through the head so as to discharge into the well casing, and having a usual T-coupling 4 at its outer end.

Arcuate slips 5 encompass pipe 3 and are adapted for radial expansion so that their toothed peripheries 6 engage the threads of coupling collar 2 for locking the slips relative to the well casing, and the lower ends of the slips are preferably of restricted diameter so as to form a split annulus 7 for reception of a packing sleeve 8 which is adapted for radial expansion so as to pack-off between the slips and the well casing. The pipe 3 is preferably held against axial movement relative to the locked slips, by means of a collar 10 threaded on the outer end of the pipe and a plate 9 mounted on the inner end of the pipe and adapted to abut against and support the packing 8.

The slips 5 are preferably provided with a tapered annular shoulder 11 at their upper ends adapted to seat in the usual counterbored end of coupling collar 2, and the outer periphery of the annular shoulder 13 which is formed on the slips by restricting the diameter of their lower ends to that of annulus 7, is preferably adapted to seat on the end of the well casing 1 which depends from coupling collar 2, thereby supporting the slips in the casing ready for expansion to locking position. The slips are preferably expanded by a tapering mandrel 14 journaled on pipe 3 and adapted for wedging threaded engagement in a cooperating tapering bore 15 of the slips, the tapering mandrel being unscrewed from bore 15 so as to permit contraction of the slips when the head is first inserted in the well casing as shown in Fig. 1, and the tapering mandrel being then screwed into its cooperating tapering bore for expanding the slips to locking position as shown in Fig. 2. The mandrel may be provided with a collar 16 at its outer end adapted for engagement by a usual operating lever 17 for rotating the mandrel.

The locking expansion of the slips will radially expand packing 8 through abutment by the radially expanded split annulus 7, and the packing sleeve is preferably then further expanded to insure a tight packing engagement with casing 1, by axially shifting plate 9 so as to longitudinally compress the packing against the inner peripheral portion of shoulder 13 and thereby radially expand the packing. For this purpose the plate 9, which may be screwed onto pipe 3 and held in place by a lock nut 18, preferably has a tapering periphery 19 adapted to

engage the correspondingly tapered lower end of sleeve 8 so that axial abutment by the plate will positively radially expand the packing, and the plate 9 may be axially shifted for thus expanding the packing by screwing the collar 10 along the pipe 3 until it abuts against collar 16, and then continuing the threaded rotation of collar 10, with the pipe 3 held against turning by the pipe lines (not shown) which are connected to the T-coupling 4, so that the pipe 3 is elevated relative to slips 5 and thereby axially shifts the plate 9. The collar 10 is preferably rotated for thus positively expanding packing 8, by means of a suitable operating lever 20.

The head when thus packed-off and locked in the well casing may be released and withdrawn by first screwing collar 10 upwardly along pipe 3 so as to relieve the pressure of plate 9 against packing 8, and then rotating mandrel 14 so as to release it from wedging engagement in bore 15, and means are preferably provided for positively contracting the slips when the mandrel is thus released. For this purpose a plate 21 may be fixed to mandrel 14 so as to overlie the upper ends of slips 5, with pins 22 on the slips engaging cam slots 23 in the plate, and the cam slots disposed as shown in Fig. 3 so that rotation of plate 21 by the mandrel 14 when the latter is wedged in bore 15, will guide the pins 22 in their slots so as to permit radial expansion of the slips, while opposite rotation of plate 21 when the mandrel is released from its wedging engagement, will engage the pins 22 by the cam slots 23 so as to positively contract the slips 5.

I have thus provided a head having extremely simple means for packing it off and locking it in a well casing or releasing it for convenient withdrawal, the locking means being positively expanded and contracted, and the packing being also adapted for positive expansion so as to insure a leak-proof construction.

The entire head may be conveniently handled as a unit by engaging the T-coupling 4 which is preferably provided with a handle 25, the slips 5 and the packing 8 being held in operative assembly relative to mandrel 14 by the plate 9, with the slips also held against displacement by the pins 22 engaging cam slots 23, and the head when lowered into collar 2 being supported at its shoulders 11 and 13 until the slips are expanded to locking position.

I claim:

1. A head for casing comprising slips having a shoulder adapted to engage the casing for supporting the slips in the casing, the slips forming a tapering threaded bore, and a tapering threaded mandrel adapted to be screwed into said bore for radially expanding the slips into locking engagement with the casing.

2. A head for casing comprising slips forming a tapering bore and having peripheral teeth at one end and a restricted diameter at their opposite end forming an undercut shoulder adapted to engage the casing for supporting the slips in the casing, a packing sleeve mounted on the slips at said restricted diameter, and adapted for reception in the casing, and a tapering mandrel adapted for wedging reception in the tapering bore for radially expanding the slips so as to engage the teeth and the packing with the casing.

3. A head for casing comprising slips forming a tapering threaded bore and having peripheral teeth at one end and a restricted diameter at their opposite end, a packing sleeve mounted on the slips at said restricted diameter, and a tapering mandrel adapted to be screwed into the tapering bore for radially expanding the slips so as to engage the teeth and the packing with the casing.

4. A head for casing comprising slips forming a tapering bore, a tapering mandrel adapted for wedging reception in said bore for radially expanding the slips into locking engagement with the casing, packing adapted for longitudinal abutment against the slips, a plate engaging the opposite end of the packing, a support for the plate projecting through the mandrel, and means engaging the mandrel for longitudinally shifting the support relative thereto so that the plate longitudinally compresses the packing against the slips for radially expanding the packing into engagement with the casing.

5. A head for casing comprising slips forming a tapering threaded bore, a tapering threaded mandrel adapted to be screwed into said bore for radially expanding the slips into locking engagement with the casing, packing adapted for longitudinal abutment against the slips, a plate engaging the opposite end of the packing, a support for the plate projecting through the mandrel, and means engaging the mandrel for axially shifting the support relative thereto so that the plate longitudinally compresses the packing against the slips for radially expanding the packing into engagement with the casing.

6. A head for casing comprising slips forming a tapering bore and having peripheral teeth at one end and a restricted diameter at their opposite end forming an undercut shoulder, a packing sleeve mounted on the slips at said restricted diameter and abutting against said shoulder, a tapering mandrel adapted for wedging reception in the tapering bore for radially expanding the slips so as to engage the teeth and the packing with the casing, a plate engaging the end of the packing which is remote from the undercut shoulder, a support for the plate projecting through the mandrel, and means engaging the mandrel for axially shifting the support relative thereto so that the plate exerts

pressure against the packing for radially expanding the same into engagement with the casing.

7. A head for casing comprising slips forming a tapering threaded bore, a tapering threaded mandrel adapted to be screwed into said bore for radially expanding the slips into locking engagement with the casing, pins projecting from the slips, and a plate rotatable with the mandrel and having cam slots engaging the pins for contracting the slips when the mandrel is unscrewed from the cooperating bore.

8. In combination, casing having an internal supporting shoulder, slips adapted for mounting in the casing on the shoulder and forming a tapering threaded bore, and a tapering threaded mandrel adapted to be screwed into said bore for radially expanding the slips into locking engagement with the casing.

9. A head for casing comprising slips having a shoulder adapted to engage the casing for supporting the slips in the casing, the slips forming a tapering bore, packing mounted on the slips, and a tapering mandrel adapted for wedging reception in the tapering bore for radially expanding the slips and the packing into engagement with the casing.

10. In combination, casing having an internal supporting shoulder, slips adapted for mounting in the casing on the shoulder and forming a tapering threaded bore, packing mounted on the slips, and a tapering mandrel adapted for wedging reception in the tapering bore for radially expanding the slips and the packing into engagement with the casing.

11. A head for casing comprising slips forming a tapering threaded bore, packing on the slips, and a tapering mandrel adapted to be screwed into the tapering bore for radially expanding the slips and the packing into engagement with the casing.

12. A head for casing comprising slips forming a tapering bore, a tapering mandrel adapted for wedging reception in said bore for radially expanding the slips into locking engagement with the casing, packing adapted for longitudinal abutment against the slips, and means for longitudinally compressing the packing against the slips so as to radially expand the packing into engagement with the casing.

13. A head for casing comprising slips forming a tapering bore, a tapering mandrel adapted for wedging reception in said bore for radially expanding the slips into locking engagement with the casing, packing adapted for longitudinal abutment against the slips, and actuating means longitudinally abutting against the mandrel and adapted for adjustment relative thereto for longitudinally compressing the packing against the slips so as to radially expand the packing into engagement with the casing.

14. A head for casing comprising slips forming a tapering bore, a tapering mandrel adapted for wedging reception in said bore for radially expanding the slips into locking engagement with the casing, packing adapted to engage the casing, and actuating means longitudinally abutting against the mandrel and adapted for adjustment relative thereto for longitudinally compressing the packing so as to radially expand the packing into engagement with the casing.

15. A head for casing comprising slips forming a tapering threaded bore, a tapering threaded mandrel adapted to be screwed into said bore for radially expanding the slips into locking engagement with the casing, packing adapted to engage the casing, and actuating means longitudinally abutting against the mandrel and adapted for adjustment relative thereto for longitudinally compressing the packing so as to radially expand the packing into engagement with the casing.

16. A head for casing comprising slips forming a tapering bore, packing mounted on the slips, a tapering mandrel adapted for wedging reception in the tapering bore for radially expanding the slips and the packing into engagement with the casing, and means for longitudinally compressing the packing so as to radially expand the same.

17. A head for casing comprising slips forming a tapering bore, the slips having an undercut shoulder, packing mounted on the slips and longitudinally abutting against said shoulder, a tapering mandrel adapted for wedging reception in the tapering bore for radially expanding the slips and the packing into engagement with the casing, and means for longitudinally compressing the packing against the undercut shoulder so as to radially expand the packing.

18. A head for casing comprising slips forming a tapering bore, packing mounted on the slips, a tapering mandrel adapted for wedging reception in the tapering bore for radially expanding the slips and the packing into engagement with the casing, and actuating means longitudinally abutting against the mandrel and adapted for adjustment relative thereto for longitudinally compressing the packing so as to radially expand the same.

In testimony whereof I have affixed my signature.

JOHN W. MacCLATCHIE.