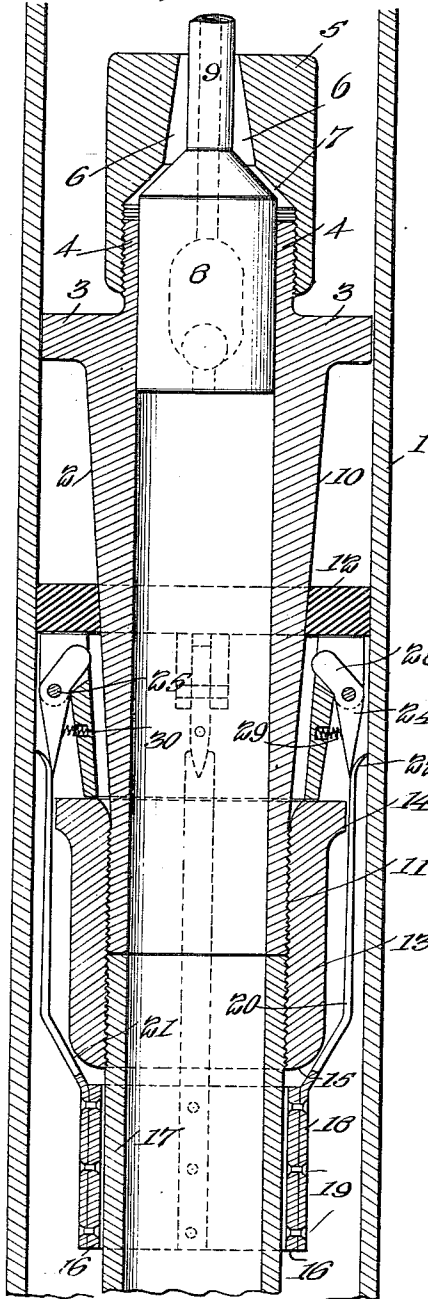


1,034,963.

Patented Aug. 6, 1912.

2 SHEETS-SHEET 1.

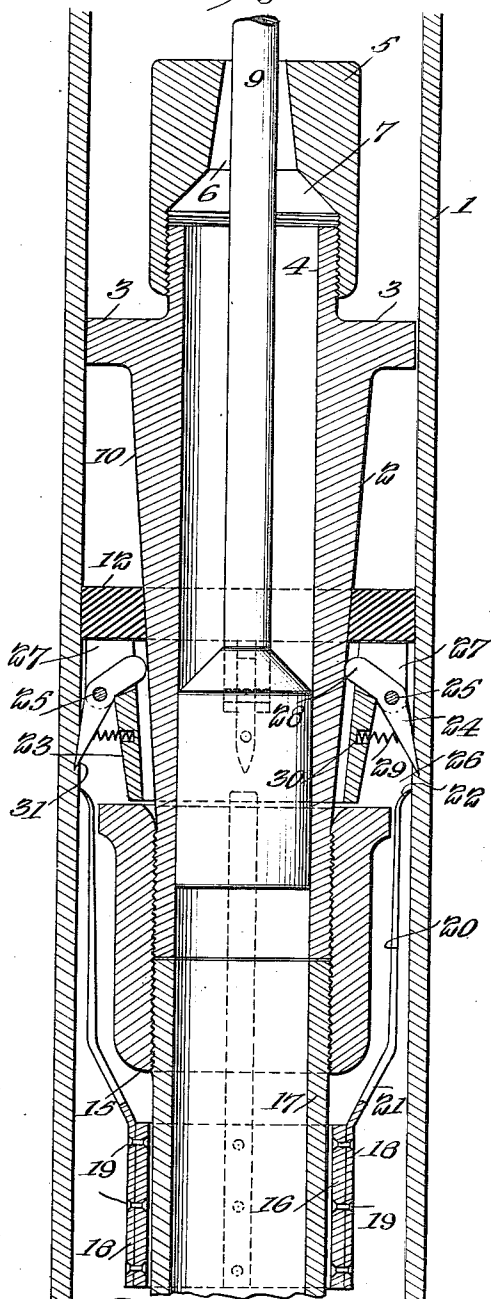
Fig. 1.



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Fig. 2.



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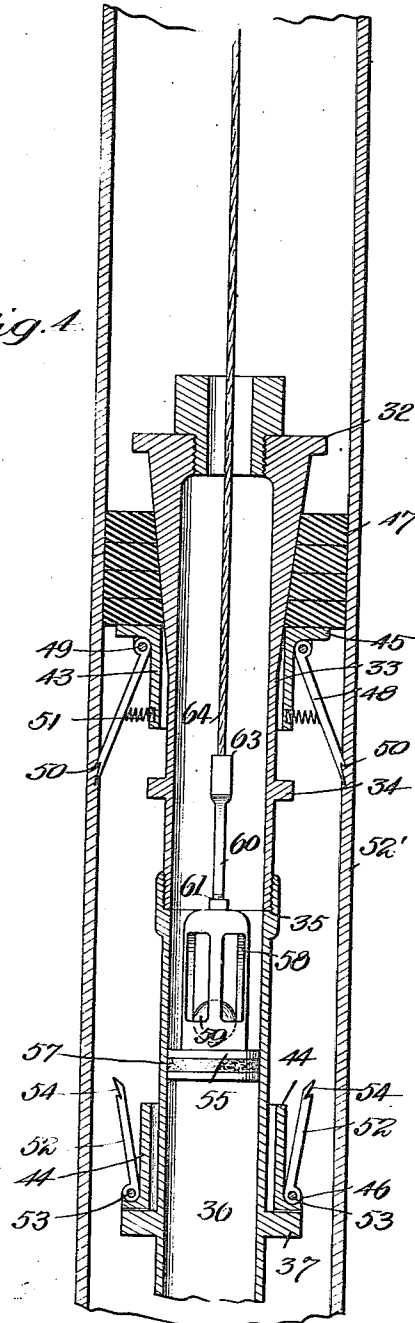
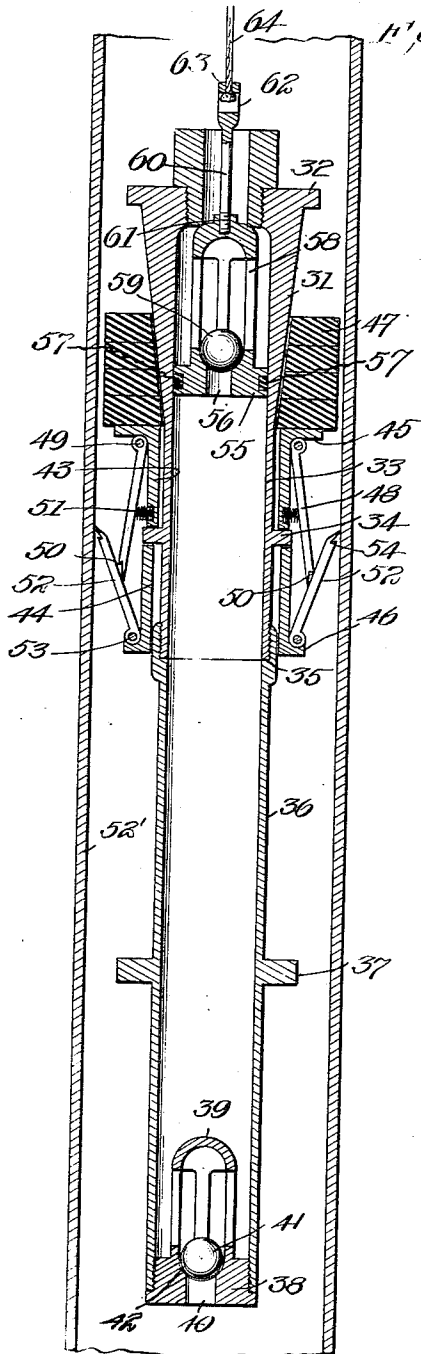
WELL PACKING.

APPLICATION FILED SEPT. 22, 1911.

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Patented Aug. 6, 1912.

2 SHEETS-SHEET 2.



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UNITED STATES PATENT OFFICE.

EDMOND G. BOUTTE, OF ST. MARTINVILLE, LOUISIANA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO BENNETT OIL COMPANY, OF PHOENIX, ARIZONA, A CORPORATION OF ARIZONA.

WELL-PACKING.

1,034,963.

Specification of Letters Patent.

Patented Aug. 6, 1912.

Application filed September 22, 1911. Serial No. 650,669.

To all whom it may concern:

Be it known that I, EDMOND G. BOUTTE, a citizen of the United States, and a resident of St. Martinville, in the parish of St. Martin and State of Louisiana, have invented certain new and useful Improvements in Well-Packings, of which the following is a specification.

My invention is an improvement in packings, and has for its object the provision of a device of the character specified, especially adapted for deep wells, designed to be operated by a cable or the like, and adapted also to act as a seal for the well when required.

In the drawings:—Figures 1 and 2 are longitudinal sections of a well provided with the pump, and showing the parts in different positions, the lower portion of the pump proper containing the check valve being omitted, and Figs. 3 and 4 are similar views of another embodiment of the invention, Fig. 3 showing the check valve in place.

The present embodiment of the invention is shown in a well tube or casing 1 and comprises a hollow shaft or mandrel 2 provided at its upper end with an annular rib or flange 3 which fits the tube 1 loosely, the mandrel being of considerably smaller diameter than the casing. Above the flange the shaft is provided with an externally threaded nipple 4 on which is threaded a packing washer 5. The bore of the washer is reduced and tapering at its upper end at 6, and the reduced portion is connected to the internally threaded portion by a tapering portion 7.

A plunger or piston 8 is slidable in the shaft and is provided with an integral stem 9 extending through the washer. The outer surface of the shaft tapers from the flange 3 to approximately one-half the length of the shaft, as indicated at 10, and below the tapering portion the shaft is externally threaded at 11 for a considerable distance. Below the threaded portion a pipe 17 is arranged and is connected to the shaft by a sleeve to be described.

A packing ring 12 encircles the tapering portion 10 of the shaft or mandrel, and a sleeve 13 connects the said shaft or mandrel with a plain pipe 17. The upper end of the sleeve 13 flares outwardly, as indicated at

14, and the lower end is rounded as shown at 15. A shell or sleeve 16 encircles the said plain pipe 17 and resilient arms 18 are connected to the shell by rivets 19. The arms 18 are spaced at angular distances of 90 degrees and are secured to the shell over the full length thereof. Above the shell the arms are offset outwardly at 20, and an angular portion 21 connects the offset portions. The upper end of each arm curves outwardly, as indicated at 22, the tip of the portion 22 being pointed and moving against the inner surface of the tube.

A ring 23 encircles the tapered portion of the shaft loosely, below the ring 12, and four pawls or dogs 24 are pivoted at 25 intermediate their ends in recesses 26 in the outer face of the said ring. Each recess communicates with the interior of the ring at its upper end by a slot 27, and the upper end 28 of each dog extends through the adjacent slot. A spring 29 is seated in each recess, engaging the pawl at one end, and a depression 30 in the recess at the other, and the springs press the lower ends of the dogs outwardly. The said lower ends are pointed, as indicated at 31, for engaging and biting into the casing 1 of the well.

The curved ends 22 of the arms 18 are designed to engage outside of the pointed ends of the dogs 24 to hold the dogs in the inward position of Fig. 1 against the resistance of the springs 29. The tapering portion of the mandrel acts to expand the packing ring 12 to tightly seal the tube 1.

The ring 23 rests upon the flaring portion 14 of the sleeve 13 and when the device is in use, a cable or like flexible strand is connected to the stem 9 of the plunger. The reduced bore of the packing nut 5 prevents the plunger 8 from becoming disengaged from the shaft.

In the construction shown in Figs. 3 and 4, the hollow shaft or mandrel is tapering externally for a portion of its length at its upper end as indicated at 31, and the said upper end is provided with an annular lateral flange 32. Below the tapering portion, the mandrel is cylindrical both internally and externally as indicated at 33 and is provided with an annular flange or rib 34, intermediate the lower end and the adjacent end of the tapering portion. The said

lower end is threaded externally, and is engaged by the enlarged internally threaded upper end 35 of a pipe 36, provided intermediate its ends with an annular rib 37, and having its lower end internally threaded to receive a valve casing 38. A cage 39 is arranged over the opening 40 through the casing, and a ball valve 41 is movable in the cage, and coöperates with the seat 42 at the upper end of the opening. A sleeve 43 encircles the plain portion of the pipe above the rib 34, and another sleeve 44 encircles the said portion below the rib. The sleeve 43 has an annular flange 45 at its upper end, and the sleeve 44 has a similar flange 46 at its lower end. A plurality of packing rings 47 is arranged above the sleeve 43 and encircling the tapering portion 31 of the mandrel, the said rings being superposed, and resting upon the flange 45. Pawls 48 are pivoted to the sleeve 43 just below the flange 45 as indicated at 49, and the free ends of the said pawls are provided with a plurality of points 50. Springs 51 are arranged within recesses in the periphery of the sleeve 43, and normally press the pawls outwardly into engagement with the inner face of the well casing 52. Similar pawls 52 are pivoted to the sleeve 44 adjacent to the flange 46 as indicated at 53, and the free ends of the said pawls are likewise provided with a plurality of points as indicated at 54. The pawls 48 have their free ends pointing downward, while the pawls 52 have their free ends pointing upward. A valve casing 55 is slidable in the mandrel, the said casing having a central opening 56, and an annular packing ring 57. A cage 58 is arranged above the opening 56, and a ball valve 59 is movable in the cage. A rod 60 is threaded into a boss 61 in the top of the cage, and the upper end of the said rod is provided with a ring 62. A vertical opening 63 is provided in the ring for receiving a cable or the like 64 for operating the device.

In the operation of the device shown in Figs. 1 and 2, a cable or the like is connected to the stem 9 of the plunger. The plunger is introduced into the mandrel by removing the washer 5, inserting the plunger and then replacing the washer. The collar 16 is then slipped upwardly, until the points 22 of the arms 20 engage the points of the pawls 24—28, and press the said pawls inwardly into the position shown in Fig. 1. The device is then suspended over the well casing, and is ready to be lowered into the well. The entire device at this time is suspended by the plunger, and the said plunger and stem is necessarily of considerable strength in order to be able to support the weight. The device is lowered into the well until it reaches the depth required, after which it is drawn upward

twelve or more inches. It will be noted that the outwardly curved ends 22 of the arms 20 by their engagement with the inner wall of the casing 1 will hold the sleeve 16 from upward movement, thus releasing the dogs. The said dogs will be opened by the springs 29, and the points thereof will engage the inner surface of the well casing, thus supporting the sleeve 23 to which they are connected. When the rope or cable connected to the plunger is relaxed, the mandrel will drop downwardly, and the packing rings 12 will be expanded by the tapering portion of the mandrel, and will seal the space between the mandrel and the casing. To operate the pump, the plunger 8, which is the traveling valve, is attached to suitable mechanism for reciprocating the same, as for instance, the walking beam of the engine. When the plunger moves downward, the liquid will lift the ball valve therein, and will flow above the plunger. When the plunger is lifted, the liquid will be lifted, and a continuation of this reciprocating movement will finally cause the liquid to flow out at the top of the well casing. No foot valve is necessary with this construction, although such valve may be used if required. Preferably a check valve like that shown in Figs. 3 and 4 is made use of with the construction shown in Figs. 1 and 2.

In the construction shown in Figs. 3 and 4, the operation is practically the same, at least so far as pumping is concerned. With this construction, the device is lowered in the well in the manner described, with the pawls in the position shown in Fig. 3, that is, with the lower pawls 52 holding the upper pawls 48 in inward position. When the device reaches the required depth, it is lowered for a short distance farther, and is then drawn upward. The points of the pawls 52 engage the casing, and prevent upward movement of the sleeve 44, which is left in lowered position, thus releasing the pawls 48. When the device is again lowered, the pawls 48 engage the well casing as shown in Fig. 4, and lock the device from further downward movement. The tapering portion 31 of the mandrel expands the packing rings 47, thus sealing the space between the mandrel and the casing. The operation of pumping is precisely the same as in the construction shown in Figs. 1 and 2.

It will be noticed that the two constructions are substantially the same. In both cases, the mandrel is provided with a plurality of sleeves, one of which is movable longitudinally thereof and each sleeve is provided with pawls. The pawls of the upper sleeve point downwardly, and those of the lower sleeve point upwardly, both series of pawls are pointed for engaging the inner face of the well casing. The lower pawls

act to hold the upper pawls out of engagement with the casing, during the lowering of the device to the predetermined point in the casing, and afterward act to hold the movable sleeve while the mandrel is being drawn upward, and thus releasing the uppermost pawls. Both mandrels are also provided with the tapering or wedge-shaped portion for expanding the packing to seal the casing.

I claim:—

1. In combination, a hollow mandrel having the outer surface of its upper end gradually increasing in cross section from below upward, a plurality of sleeves encircling the mandrel below the tapering portion, said mandrel having an external rib for separating the sleeves, the sleeves being movable longitudinal of the mandrel, means for limiting the movement of the upper sleeve, pawls connected with each sleeve, the pawls of the upper sleeve pointing downward, and the pawls of the lower sleeve pointing upward and being of a length to over-lap the lower ends of the uppermost pawls when the sleeves are adjacent to each other, to hold the said pawls out of engagement with the inner surface of the well casing, each series of pawls being pointed to engage the well casing to hold the sleeve to which they are attached, springs engaging the pawls of the upper sleeve and acting normally to hold such pawls in operative position, a plunger in the mandrel, and packing rings encircling the tapering portion of the mandrel and resting on the upper sleeve.

2. In combination, a hollow mandrel having the outer surface of its upper end gradually increasing in cross section from below upward, a plurality of sleeves encircling the mandrel below the tapering portion, the sleeves being movable longitudinal of the mandrel, means for limiting the movement of the upper sleeve, pawls connected with each sleeve, the pawls of the upper sleeve pointing downward, and the pawls of the lower sleeve pointing upward and being of a length to over-lap the lower ends of the uppermost pawls when the sleeves are adjacent to each other, to hold the said pawls out of engagement with the inner surface of the well casing, each series of pawls being pointed to engage the well casing to hold the sleeve to which they are attached, springs engaging the pawls of the upper sleeve and acting normally to hold such pawls in operative position, a plunger in the mandrel, and packing rings encircling the tapering portion of the mandrel and resting on the upper sleeve.

3. In combination, a hollow mandrel having the outer surface of its upper end gradually increasing in cross section from below upward, a plurality of sleeves encircling the mandrel below the tapering portion, the

sleeves being movable longitudinal of the mandrel, means for limiting the movement of the upper sleeve, pawls connected with each sleeve, the pawls of the upper sleeve pointing downward, and the pawls of the lower sleeve pointing upward and over-lapping the lower ends of the uppermost pawls when the sleeves are adjacent to each other to hold the said pawls out of engagement with the well casing, a plunger in the mandrel, and a packing ring encircling the tapering portion of the mandrel and resting on the upper sleeve.

4. In combination, a hollow mandrel, a plurality of sleeves encircling the mandrel, means for limiting the longitudinal movement of the upper sleeve, a plurality of pawls connected to each sleeve, the pawls of the upper sleeve pointing downward and the pawls of the lower sleeve pointing upward and over-lapping the lower end of the uppermost pawls when the sleeves are adjacent to each other, a plunger in the mandrel, packing rings encircling the mandrel above the sleeves, means in connection with the mandrel for expanding the said rings when the mandrel moves downward with respect to the uppermost sleeve, and springs pressing the upper pawls outward.

5. In combination, a hollow mandrel, a plurality of series of pawls, the series being arranged one above the other, and the pawls of the upper series pointing downward and the pawls of the lower series pointing upward, and over-lapping the points of the pawls of the upper series when the said pawls are adjacent to each other, normally active means for pressing the pawls of the upper series outward into engaging position, means for supporting each series for movement longitudinally of the mandrel, means for limiting the longitudinal movement of the upper series, and means for sealing the space between the mandrel and the casing when the mandrel moves downward with respect to the upper series of pawls.

6. In combination, a hollow mandrel, a plurality of series of pawls, the series being arranged one above the other, and the pawls of each series pointing toward the pawls of the other series, the pawls of the lower series engaging the pawls of the upper series and holding the said pawls in inoperative position when the series are adjacent to each other, normally active means for moving the pawls of the upper series into active position, means for supporting each series of pawls for movement longitudinally of the mandrel, a sealing device supported by the mandrel for sealing the space between the mandrel and the casing, means operated by the downward movement of the mandrel with respect to the said sealing means for operating the said sealing means, the means

for supporting the upper series of pawls being arranged below the sealing means to hold said sealing means from movement downward with the mandrel when the upper series of pawls are in engagement with the casing.

7. Means for sealing a well casing, comprising a mandrel, having a portion of its external surface tapering from above downward, a packing ring encircling the mandrel and adapted to be packed between the mandrel and the inner surface of the casing by the tapering portion of the mandrel when the said mandrel is moved downwardly with respect to the packing, normally active means for engaging the casing wall to prevent downward movement of the packing means, means supported by the mandrel for restraining the action of the said engaging means, and means in connection with the said restraining means, for engaging the

casing wall to release the engaging means from the restraining means when the mandrel has moved upward.

8. Means for sealing a well casing, comprising a mandrel, a packing encircling the mandrel, means whereby a downward movement of the mandrel with respect to the packing will compress the packing to seal the space between the mandrel and the casing, normally active means for holding the packing from downward movement with the mandrel, means for restraining the operation of the holding means, and means in connection with the restraining means for engaging the casing wall to prevent upward movement of the restraining means to release the holding means.

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Witnesses:

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