

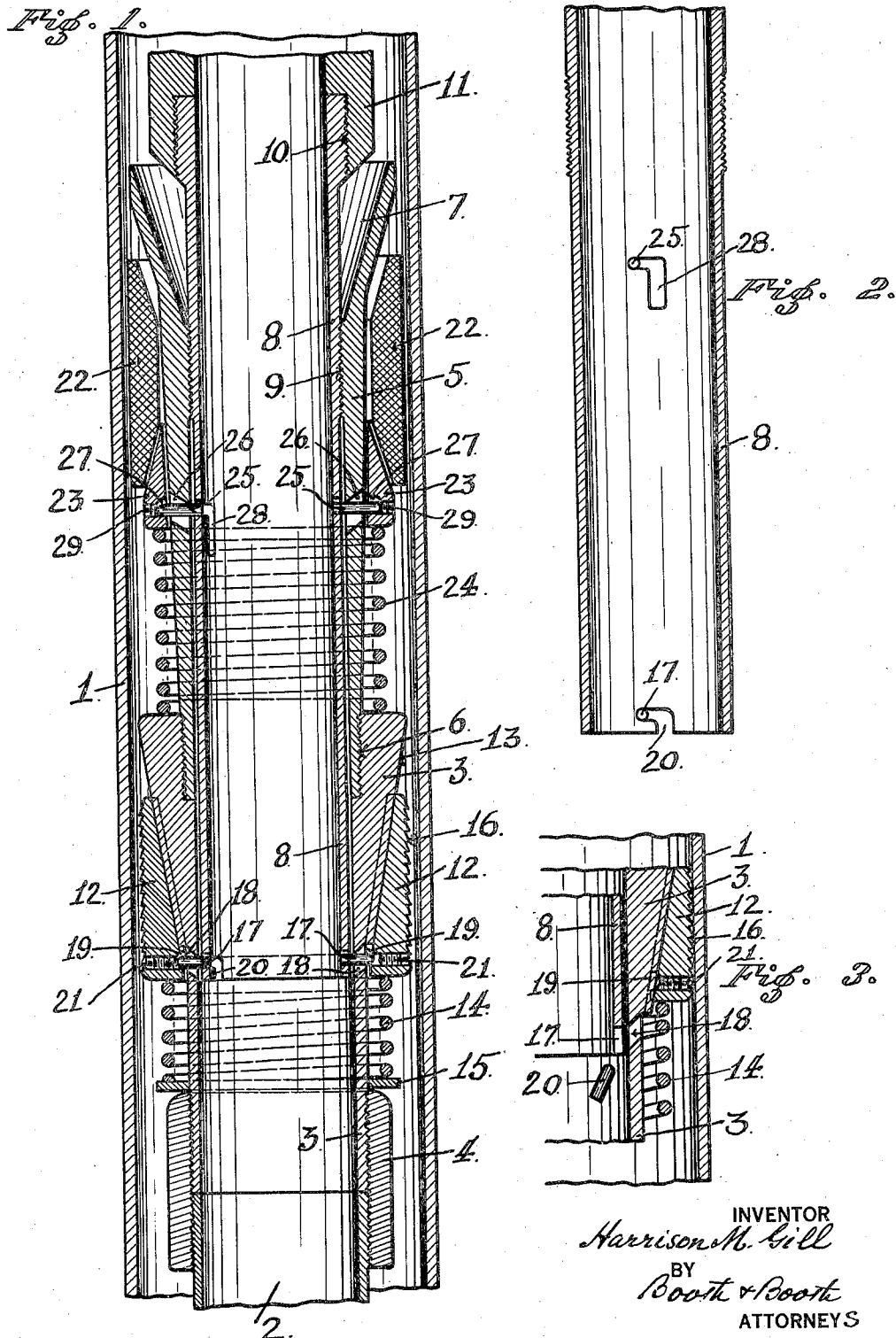
Oct. 26 , 1926.

1,604,771

H. M. GILL

LINER ADAPTER FOR WELL CASINGS

Filed August 10, 1925



UNITED STATES PATENT OFFICE.

HARRISON M. GILL, OF TAFT, CALIFORNIA.

LINER ADAPTER FOR WELL CASINGS.

Application filed August 10, 1925. Serial No. 49,246.

My invention relates to devices for setting and supporting liners in well casings.

In drilling wells it sometimes becomes necessary to place a liner, i. e. a string of pipe of smaller diameter than the casing, inside said casing, and extending downwardly from some point below the surface to the bottom of the well or to some other point below the bottom of the casing.

The object of my invention is to provide a simple and easily operated device for setting such a liner in a well, with its upper end at any desired point; for partially or wholly supporting said liner by engagement with the casing; for packing off the space between the casing and the liner; and for providing an adapter to make a smooth and free entrance to the upper end of the liner from the larger casing above it. A further object is to provide means for readily removing the liner, or any amount of its upper portion, from the well.

These and other objects will become apparent from the following specification, which must be read with the understanding that the form, proportion, and construction of the device, as described and illustrated herein, may be varied, within the limits of the claims hereto appended, without departing from the spirit of the invention as set forth in said claims.

With this in view a preferred embodiment of my invention will now be fully described with reference to the accompanying drawings, wherein:—

Fig. 1 is a central vertical section of my complete device.

Fig. 2 is a central vertical section of the setting sleeve taken at right angles to the section of Fig. 1.

Fig. 3 is a sectional detail showing one of the slip releasing pins in its released position.

In the drawings, the reference numeral 1 designates the well casing, which is understood to extend from the surface to some point in the well below the region of Fig. 1. 2 is the upper end of the string of liner pipe, which may extend downwardly to the bottom of the well, or to any other desired point therein. 3 is a tubular anchor body member, connected with the upper end of the liner 2 by the usual screw collar 4. 5 is a tubular adapter member, connected

with the anchor body 3 in any desired manner, as for example by screw threads 6, and provided with an outwardly flaring upper end or entrance mouth 7, which approaches, in near proximity, the inner surface of the casing. 8 is a tubular setting sleeve, extending interiorly through the adapter 5 and part way through the anchor body 3, and having a preferably left-hand threaded connection at 9 with said adapter. The upper end of said setting sleeve is preferably provided with a standard thread 10 for connection with a socket member or tubing string, indicated at 11, by which the device, with the liner string attached thereto, may be lowered into the well.

The anchor body 3 carries a suitable number of toothed gripper-slips 12, mounted in any well known manner, as for example in guide ways, not shown, and adapted to be forced outwardly, into contact with the casing 1, by being moved upwardly upon the outwardly tapering sides 13 of the anchor body by a spring 14, which seats upon a collar 15 secured to said body. On account of their toothed outer faces, indicated at 16, said slips, when moved upwardly and outwardly upon said anchor body, engage the casing with sufficient grip to support the weight of the entire liner; or if the lower end of said liner rests upon the well bottom, a portion of its weight may be supported by said slips to prevent buckling.

The slips 12 are retained in the position shown in Fig. 1, while the device is being lowered into the well, by pins 17, extending freely through apertures 18 in the walls of the anchor body 3. The outer ends of said pins engage sockets 19 in the slips, and their inner ends lie within the horizontal portions of right-angle or bayonet slots 20, Fig. 2, formed in the wall of the setting sleeve 8. Apertures, closed by screws 21, Fig. 1, may be formed in the slips 12 in line with the sockets 19, through which the pins 17 may be placed in position initially.

When the device reaches the desired depth in the well, the setting sleeve 8 is rotated slightly to cause the inner ends of the pins 17 to pass from the horizontal to the vertical portions of the bayonet slots 20. The spring 14 thereupon forces the slips 12 upwardly, the pins 17 dropping out into the interior of the sleeve 8, as shown in Fig.

3. The apertures 18 in the anchor body 3 are inclined, as shown, and are sufficiently wide to permit the pins to drop out when their inner ends are freed by the rotation of the sleeve 8.

Surrounding the adapter member 5 is a flexible packer member 22, Fig. 1, adapted to be expanded into engagement with the casing 1, to pack off the space between said casing and the adapter member, by a tapered slip ring 23. A spring 24, seated upon the upper end of the anchor body 3, bears against said slip ring 23 to force it upwardly. Said ring is held in the position shown, while the device is being lowered into the well, by pins 25, functioning similarly to the pins 17 described above. Said pins 25 pass freely through apertures 26 in the adapter, and have their outer ends in engagement with sockets 27 in the slip ring 23, and their inner ends lying in the horizontal portions of right-angle slots 28, Fig. 2, formed in the setting sleeve 8. Apertures, closed by screws 29, may be provided in the slip ring 23 for initially inserting said pins. When the setting sleeve 8 is rotated, to set the anchor slips 12, the packer release pins 25 are also freed by moving into the vertical portions of the slots 28, thus allowing the slip ring 23 to be moved upwardly by its spring 24, to expand the packer 22.

It will be seen from the foregoing description that, in operation, the device is first attached to the upper end of the liner 2 or string of liner pipe, by the collar 4, and the whole then lowered into the well through its casing 1, by means of a suitable socket member 11 attached to a cable, not shown, or by any other suitable means. When the desired depth is reached, the setting sleeve 8 is given a slight turn, freeing the pins 17 and 25, and causing the anchor slips 12 and the packer 22 to be set against the well casing. The setting sleeve 8 may then be removed, by unscrewing it at the left-hand threads 9 and raising it out of the well with the suspending means.

With the setting sleeve 8 removed, the device remains in the well as a combination adapter, anchor, and packer for the upper end of the liner, providing a free passage into the liner of the same interior diameter as said liner. The flaring upper end or mouth 7 of the body 5 enables drilling or other tools or pumping apparatus to be lowered into the liner without catching on a square shoulder; the anchor body 3 and its slips 12 support the liner, either partially or wholly, to prevent it from collapsing or buckling; and the packer 22 prevents circulation between the liner and the casing, and also prevents sand or other material from dropping between said liner and casing to stick or freeze the liner. Moreover, the liner, or any cut off upper portion thereof,

may be removed, if necessary, by merely screwing a suitable member or tool into the thread 9 and pulling up the entire device.

I claim:

1. A liner adapter for well casings comprising a tubular body member adapted for connection with a liner; a gripping member movably carried by said body for engaging the casing; means for holding said gripping member in inoperative position; and a removable sleeve within said body, said sleeve being movable to release said holding means.

2. A liner adapter for well casings comprising a tubular body member adapted for connection with a liner; a gripping member movably carried by said body for engaging the casing; means carried by the body for packing off the space between said body and the casing; means for holding said gripping means and said packing means in inoperative position; and a removable sleeve within said body, said sleeve being movable to release said holding means.

3. A liner adapter for well-casings comprising a tubular body member adapted for connection with a liner; gripping means carried by said body member for anchoring it to the casing; means carried by said body member for packing off the space between the body member and the casing; means for holding said gripping and said packing means temporarily out of function to permit the body member to freely pass down in the casing; and means associated with said body member for releasing said holding means to permit said gripping and said packing means to function.

4. A liner adapter for well-casings comprising a tubular body member adapted for connection with a liner, said body member having at its upper end a flaring entrance mouth adapting it to the inner surface of the casing; gripping means carried by said body member for anchoring it to the casing; means carried by said body member for packing off the space between the body member and the casing; means for holding said gripping and said packing means temporarily out of function to permit the body member to freely pass down in the casing; and means associated with said body member for releasing said holding means to permit said gripping and said packing means to function.

5. A liner adapted for well-casings comprising a tubular body member adapted for connection with a liner; gripping means carried by said body member for anchoring it to the casing; means carried by said body member for packing off the space between the body member and the casing; separate means for holding said gripping means and said packing means temporarily out of function to permit the body member to freely pass down in the casing; and a member oper-

atable within said body member for simultaneously acting upon both the holding means of the gripping and the packing means to release them for function.

5 6. A liner adapter for well-casings comprising a tubular body member adapted for connection with a liner; spring actuated members carried by said body member adapted for engagement with the casing; 10 pins detachably engaging said spring actuated members for holding them out of engagement with the casing; and a movable sleeve within the tubular body member for tripping said pins.

15 7. A liner adapter for well-casings comprising a tubular body member adapted for connection with a liner; spring actuated members carried by said body member adapted for engagement with the casing; 20 pins detachably engaging said spring actuated members for holding them out of engagement with the casing; and a member within the tubular body member for tripping said pins, said tripping member consisting of a 25 rotatable sleeve having bayonet slots for releasably engaging the pins.

8. A liner adapted for well-casings comprising a tubular anchor member adapted for connection with a liner; a tubular packer 30 member detachably connected above with said anchor member and having a flaring entrance mouth; casing gripping slips carried by the anchor member; packing means carried by the packer member; separate 35 means for holding the gripping slips and the packing means out of function to permit free passage into the casing; a rotatable sleeve detachably fitted within said anchor and said packer members; and tripping 40 means actuated by the movement of said sleeve for simultaneously releasing the holding means of the gripping slips and the packing means to permit them to function.

9. A liner adapter for well-casings comprising a tubular body consisting of an anchor member and a packer member detachably connected in alignment, one of said 45 members having a flaring entrance mouth, and the other being adapted for connection with a liner; and a removable sleeve within 50 said members and adapted by its movement to control the operation thereof.

10. A liner adapter for well-casings comprising a tubular body consisting of aligned, 5 detachably connected members one of which has a flaring entrance mouth, and the other

is adapted for connection with a liner; casing gripping slips carried by one of said members; packing means carried by the 60 other of said members; separate means for holding the gripping slips and the packing means out of function to permit free passage into the casing; a rotatable sleeve detachably fitted within said members; and tripping 65 means actuated by the movement of said sleeve for simultaneously releasing the holding means of the gripping slips and the packing means to permit them to function.

11. A liner adapter for well-casings comprising a tubular body member adapted for 70 connection with a liner; means carried by said body member for packing off the space between the body member and the casing; means for holding said packing means temporarily out of function to permit the body 75 member to freely pass down in the casing; and a removable sleeve within said body member for releasing said holding means to permit said packing means to function.

12. A liner adapter for well-casings comprising a body adapted for connection with 80 a liner; gripping means carried by said body for engaging the well casing; and a member removably associated with said body for controlling said gripping means, said removable member being adapted to support 85 the weight of said body when associated therewith.

13. A liner adapter for well casings comprising a body adapted for connection with 90 a liner; gripping means movably carried by said body for engaging the casing; and a sleeve removably positioned within said body, said sleeve being adapted to support the weight of said body and to control, by its movement, the operation of said gripping means.

14. A liner adapter for well casings comprising a body adapted for connection with 100 a liner; gripping means movably carried by said body for engaging the casing; packing means for closing the space between said body and the casing; and a sleeve removably positioned within said body, said sleeve being adapted to support the weight of said 105 body, and to control, by its movement, the operation of said gripping and packing means.

In testimony whereof I have signed my name to this specification.

HARRISON M. GILL.