

March 18, 1930.

J. D. SPALDING

1,750,822

ELEVATOR

Filed March 5, 1928

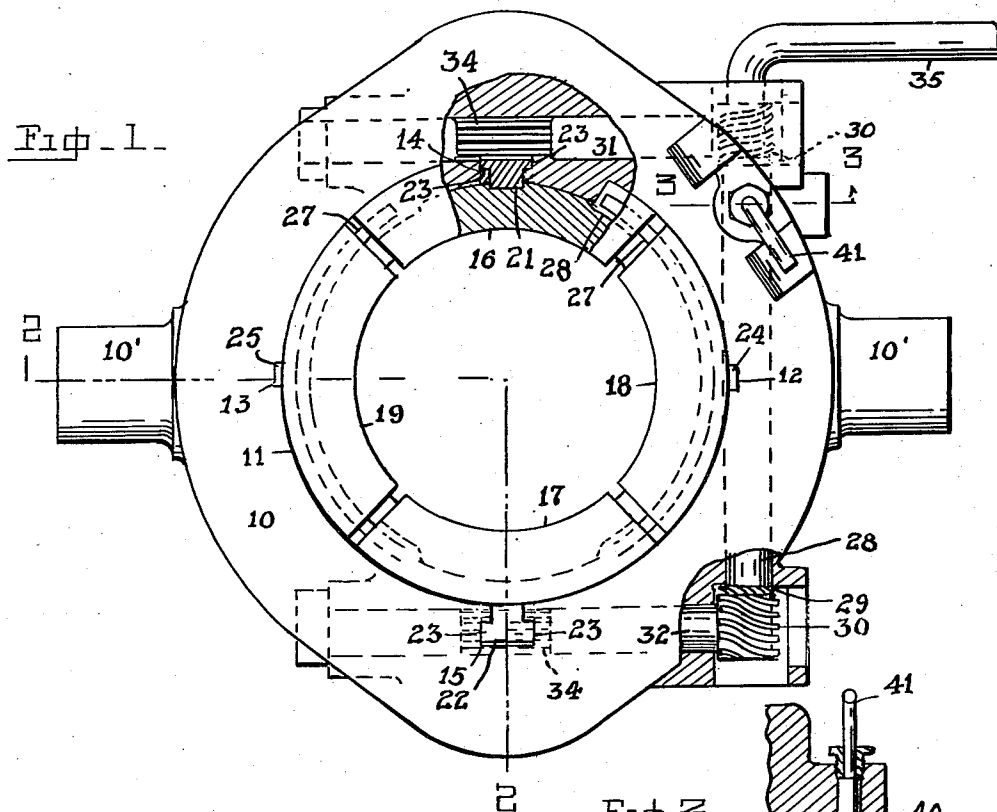


Fig. 3.

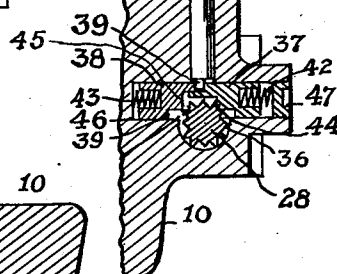
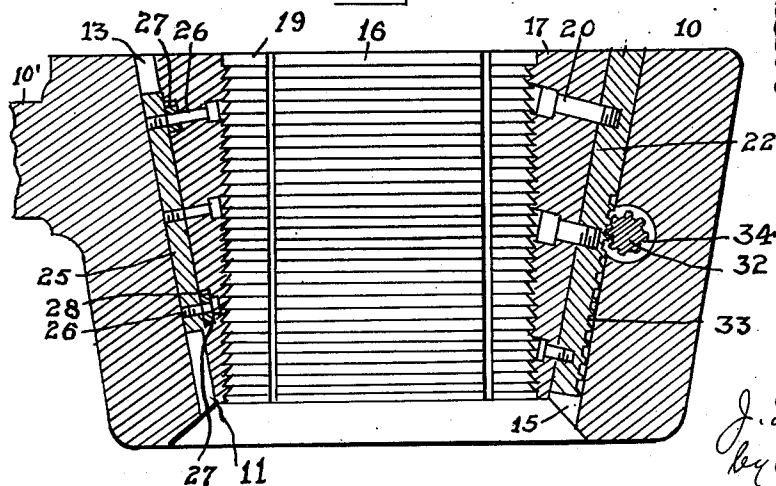


Fig. 2.



INVENTOR
J. D. Spalding
by T. N. Barker
attorney

UNITED STATES PATENT OFFICE

JOHN D. SPALDING, OF CRAFTON, PENNSYLVANIA, ASSIGNOR TO THE NATIONAL SUPPLY COMPANY, OF TOLEDO, OHIO, A CORPORATION OF OHIO

ELEVATOR

Application filed March 5, 1928. Serial No. 259,120.

My invention relates to elevators for gripping and holding in suspension strings of drill pipe or casing or the like, and particularly those strings whose sections or lengths are made up with flush joints, that is, with joints whose outside diameters are flush with the outside diameters of the pipes in the string. However, my elevator may be used to support a string of pipes by means of a coupling or collar attached to the string and resting on the upper face of the elevator in the ordinary manner.

It is the object of this invention to provide an elevator having slips mechanically operated in either direction and capable of being locked against movement in one direction. More specifically, one object is to effect the operation of the slips by means of shafts geared together. While shafts may directly operate each slip, I have provided a single means whereby the operation of the gear-operated slips operate the slips not gear-connected.

Another object is to provide easily adjusted devices whereby the slips are locked from moving in one direction after adjustment. My invention may be applied to operate slips in rotary well-drilling rigs.

Referring to the accompanying drawing, Fig. 1 is a plan view of an elevator constructed in accordance with the principles of this invention, the bail being omitted and parts being broken away; Fig. 2, a section on the line 2—2 on Fig. 1; and Fig. 3, a section on the line 3—3 on Fig. 1;

On the drawing 10 designates the metallic body or frame of the elevator. It is nearly circular and has a downwardly tapering opening 11 in whose walls are the grooves 12, 13, 14 and 15, all in planes which include the axial center of the opening 11. The frame 10 has the trunnions 10' for the usual bail or links.

Slidable up and down on the wall of the opening 11 are the four slips 16, 17, 18 and 19. The slips 16 and 17 are diametrically opposite to each other and have secured thereto by the screws 20 the guides or ribs 21 and 22. These ribs ride in the grooves 14 and 15 and have lateral flanges 23 riding in widened parts

of the grooves 14 and 15, these parts being at the outer sides of the grooves and keep the ribs and their slips from inward movement.

The slips 18 and 19 which are between the slips 16 and 17 have the guides or ribs 24 and 25 secured to them by the screws 26 and riding in the grooves 12 and 13.

The slips 18 and 19 carry curved yielding metal strips 27 which lie in grooves 28 in the outer faces of the slips and are spanned by the guides 24 and 25, the screws 26 passing through the said strips. The strips 27 have their ends projecting loosely into the adjacent edges of the slips 16 and 17, so that when the latter slips are operated in either direction, the slips 18 and 19 are caused to travel with them.

The body 10 has therein a shaft 28 lying transversely of the axis of the elevator and somewhat beyond the outer face of the guide 24. The ends of the shaft 28 have the gears 29 and 30 which drive the shafts 31 and 32 arranged at right angles with the shaft 28, their central portions lying close to the outer faces of the guides 21 and 22. The latter have rack teeth 33 in mesh with pinion teeth 34 on the shafts 31 and 32. The gears are so made that when the shaft 28 is turned by the handle 35, the shafts 31 and 32 turn to move all the slips up or all the slips down together.

The shaft 28 has an annular series of ratchet teeth 36 cooperative with the two plunger-type detents or pawls 37 and 38. The pawl 37 lies on one side of the shaft 28 and the pawl 38 on the other side thereof. They are preferably alined with each other, their inner ends engaging the opposite sides of the cam or eccentric finger 39 on the lower end of the shaft 40 turnable in the body 10 by means of the handle 41. The pawls 37 and 38 are urged toward each other and the teeth 36 by the respective helical springs 42 and 43. Preferably the spaces between consecutive teeth are right angular. The pawls have right angular inner lower teeth or corners 44 and 45 which may one at a time enter certain of the said rectangular spaces. The cam finger is so related to the adjacent parts that, when it moves one pawl so as to interlock it with one of said teeth 36, it moves the

other pawl out of interlocking engagement with another tooth 36 and holds it out of said engagement. When one of the teeth 36 is locked by one of the teeth 44 or 45, the inner face of the tooth 44 or 45 engages one face of a tooth 36 while its other face engages the nearest face of the next tooth. Thus, the rotation of the shaft 28 in one direction is prevented because one of the teeth will tend to move the interlocking pawl transversely of its direction of travel toward and away from the shaft 28, but the pawl can not be so moved as it is closely confined in the bore 46 in the body 10 having its outer end closed by the screw plug 47. The pawls have movement only toward and away from the teeth 36. As shown in Fig. 3, the shaft 28 can be turned clockwise as the tooth at the left of the pawl tooth 44 will force the pawl 37 to the right against the tension of the spring 42 which will return the pawl into locking engagement with the next tooth 36 as soon as the actuating tooth 36 has passed below the pawl tooth 44. But the shaft 28 can not be rotated anticlockwise because the tooth 36 beneath the pawl tooth 44 merely pushes the pawl more tightly against the opposite side of the opening 46 without any tendency to move it to the right.

If the shaft 40 is rotated 180°, the pawl 37 will be moved to the right out of the path of the teeth 36 and the pawl 38 will be moved by its spring 43 to the right so that its tooth 45 will interlock with a tooth 36 on the left side of the shaft 28, and thereafter permit the shaft to be turned anticlockwise but prevent its being turned in the contrary direction.

In lowering a casing into a well hole with unlocked slips it may become momentarily stuck in the hole while the elevator which has up to that time been supporting it continues to descend. This the elevator can do as the slips will yield slightly so as to allow the elevator to slide down the casing. When the driller has succeeded in releasing the casing, the slips may fail to regrip the same sufficiently to prevent the casing from dropping and causing serious damage and possibly the loss of the casing. With the parts as shown in Fig. 3, the shaft 28 can not turn anticlockwise. Consequently, the shafts 31 and 32 can not be moved by any downward movement of the body 10 relative to the slip. Therefore if a casing being lowered by the elevator should stick with the parts as in the drawing, the continued lowering of the hoist line would not cause the elevator to slip on the casing and there would be no liability of the casing slipping through the elevator when the casing is released.

In case the slips are elevated so as to enlarge the space surrounded by them, they will be securely held elevated provided the pawl 38 has previously been engaged with the teeth 36.

I claim—

1. In an elevator or the like, a frame having a downwardly tapering opening, slips guided on the wall of the opening, shafts, means for rotating the shafts, and connections between the shafts and the slips whereby the rotation of the shafts operate the slips, in combination with means to lock the shafts from rotation in either direction while permitting the locked shafts to be rotated in the opposite direction.

2. In an elevator or the like, a frame having a downwardly tapering opening, slips having travel up and down on the wall of the opening, rack teeth carried by some only of the slips, a shaft carried by the frame, means for rotating the shaft, auxiliary shafts intergeared with the first shaft and the said rack teeth, and means connecting the slips with rack teeth with those without rack teeth to cause the latter to be operated by the former.

3. In an elevator or the like, a frame having a downwardly-tapering opening, slips operated up and down on the wall of the opening, a shaft, means for rotating the same, connections between the shaft and the slips whereby the rotation of the shaft operates the slips, ratchet teeth carried by the shaft, a pair of pawl members, one to engage the ratchet teeth to prevent the rotation of the shaft in one direction and the other to engage them to prevent the rotation of the shaft in the opposite direction, means urging the pawls toward interlocking connection with the ratchet teeth, and means to selectively hold one pawl in interlocking position with the ratchet teeth and the other pawl out of interlocking position with the ratchet teeth.

In testimony whereof I hereunto affix my signature.

JOHN D. SPALDING.