

June 29, 1937.

R. T. TODD

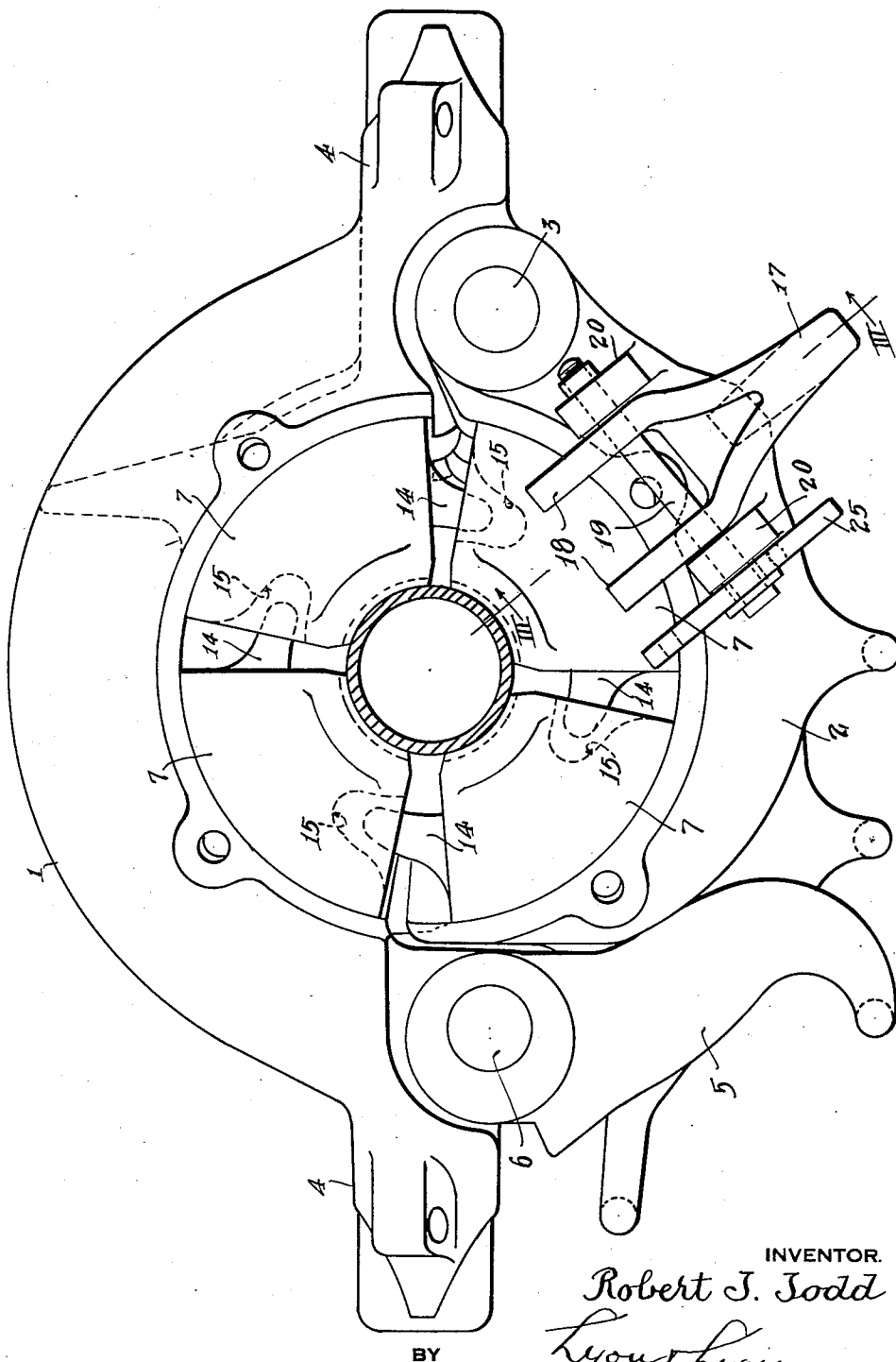
2,085,237

SLIP LOCK FOR ELEVATORS

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2 Sheets-Sheet 1

Fig. 1



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Fig. 2

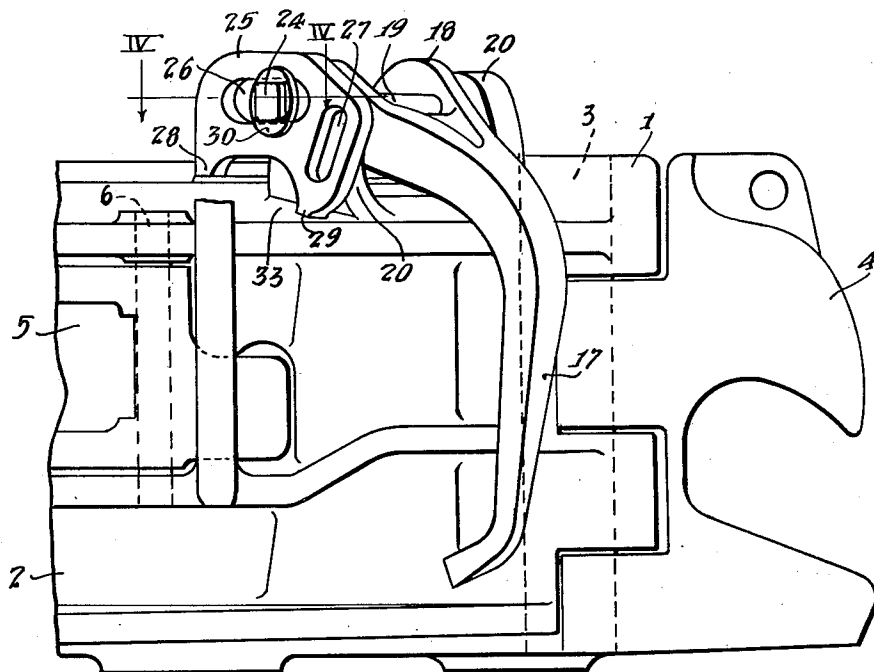


Fig.3

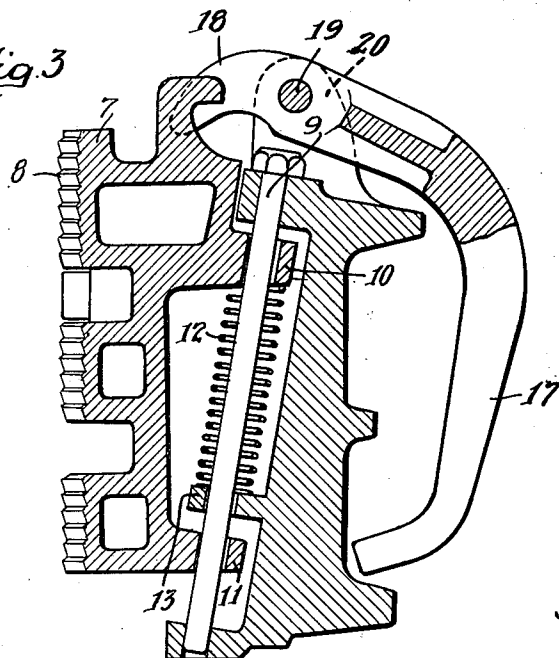
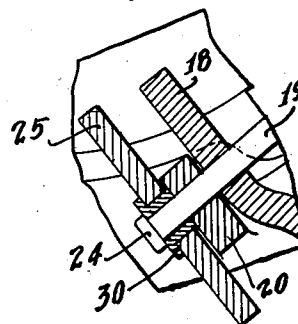


Fig. 4



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SLIP LOCK FOR ELEVATORS

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6 Claims. (Cl. 24—263)

This invention relates to slip type elevators for effecting supporting connection with a pipe, casing or the like to raise or lower the latter in a well and has as a broad object to lock the slips of the elevator in pipe-engaging position and prevent accidental release of the pipe.

A slip type elevator comprises an annular body portion adapted to enclose a pipe to be lifted, the body having on its inner surfaces inwardly and downwardly extending slip seats on which wedge-shaped slips are mounted. When the slips are in their upper or retracted positions, they clear a pipe positioned within the elevator but when the slips are in their lower or "set" position, they engage and tightly grip the pipe. The annular body portion is often formed by a pair of semi-circular jaws hingedly connected together, for convenience in applying to and removing same from the pipe. Such elevators are commonly called "door type" elevators.

To facilitate closing of an elevator about a pipe, the slips are sometimes normally held in retracted position by springs, the slips being set after closure of the elevator by forcing the slips down into engagement with the pipe; thereafter as soon as the lifting force is applied to the elevator the friction between the pipe and the slips carries the slips into fully set position and they will continue to grip the pipe so long as the latter is supported in the elevator. However, if while lowering a pipe suspended on the elevator into a well hole, the pipe catches on something and "hangs up", its weight is taken off the elevator and the slips are automatically released by their supporting springs. If the pipe is then released by whatever was causing it to "hang up", it will drop until the coupling or collar in the first pipe connection above the elevator comes down on top of the slips and resets them. However, it is readily possible that the pipe in dropping may acquire such momentum that the threaded pipe collar is unable to withstand the strain, thereby severing the pipe string and losing the lower part of it.

In accordance with the present invention, I prevent the possibility of accidents of the type described by providing a mechanism for positively locking the slips in set position and retaining them locked until they are manually released.

Various objects and features of the invention will appear from the following detailed description which refers to the drawings:

In the drawings:

Fig. 1 is a plan view of a side door elevator

incorporating the invention, various details of construction irrelevant to the present invention being omitted to avoid confusion;

Fig. 2 is a front elevation view of a portion of the elevator shown in Fig. 1;

Fig. 3 is a detail sectional view taken in the plane III—III of Fig. 1;

Fig. 4 is a horizontal detail sectional view taken in the plane IV—IV of Fig. 2.

Referring to the drawings, the elevator therein depicted comprises a pair of jaws 1 and 2, respectively, hinged together by a pin 3 for opening and closing movement. The jaws are shown in closed position in the drawings. The elevator shown is what is known as the side door type in which the jaw 1 has attached thereto at diametrically opposite points suitable lugs or trunnions 4 adapted to be engaged by a pair of links which thereby support the elevator and a pipe or casing engaged by the elevator. The jaw 2 constitutes a door cooperating with the body member 1 for completing the enclosure about a pipe. It may be firmly locked in closed position by a latch 5 which engages with a lug or shoulder on the jaw 2, the latch 5 itself being pivotally connected to the jaw 1 as by a pin 6. The detailed construction of the latch is not shown since it is immaterial to the present invention. As a matter of fact, various forms of latches may be employed, one type of which is illustrated in United States Letters Patent No. 1,795,578, issued to N. K. Smith on March 10th, 1931.

The inner surfaces of the jaws 1 and 2 are approximately conical in shape and are provided with seats for slidably supporting slips 7 which engage the pipe to be lifted. As shown to best advantage in Fig. 3, each slip 7 may have a serrate cylindrical inner face 8 adapted to engage a pipe, and may be retained against its seat in one of the jaws by a pin 9 which extends parallel to the slip seat. Thus the slip may be provided with a pair of apertured lugs 10 and 11, respectively, for engaging the pin 9 and guiding the slip. Each slip is normally supported in uppermost or retracted position (the position shown in Fig. 3) by a helical compression spring 12 which surrounds the pin 9 between a lug 13 on the associated jaw member and the lug 10 on the slip, the spring being stiff enough to overcome the weight of the slip and retain the latter at the upper end of its path of movement on its seat.

A means, to be described later, is provided for manually forcing one of the slips (the slip illustrated in Fig. 3) into lower or "set" position

and all of the slips are forced to move in unison by cooperating tongues and grooves thereon. Thus as shown in Fig. 1, each slip 7 is provided on one edge with a tongue 14 which engages in a recess 15 in the adjacent edge of the adjoining slip whereby all of the slips are linked together for simultaneous upward or downward movement.

To manually set the slips, a setting handle 17 is provided which is constituted by one end of a lever pivotally mounted upon the top of the jaw 2. Thus it will be observed that the handle 17 merges into a bifurcated end section 18, the two halves of which have eyes provided therein through which there extends a pin 19. Pin 19 is supported by lugs 20 rising from the top of the jaw 2. The two portions of the bifurcated section 18 of the lever extend above one of the slips 7 but clear the top of the slip when the handle 17 is in innermost position, as shown in the drawings. However, by grasping the handle 17 and pulling it outwardly the tips of the bifurcated end 18 of the lever are brought to bear against the upper end of the adjacent slip to force the latter downwardly along its seat into engagement with a pipe positioned within the elevator. As previously described, since all of the slips are linked together, movement of the one slip by the setting handle 17 causes the remaining slips to also move into set position.

However, after the slips are once set and the handle 17 released, the latter drops into the normal position shown in the drawings so that it no longer functions to maintain the slips in set position. Therefore, should the slips become disengaged from the pipe, there is nothing to prevent them from being restored to normal retracted position by the springs 12.

To prevent such retraction of the slips after they have once been set, a locking wedge 25 is provided. This wedge is a member of substantially uniform thickness having a slot 26 which receives the pin 19 and a second slot 27 which constitutes a finger hole to permit grasping the end of the wedge. The wedge has two bearing surfaces or feet 28 and 29, respectively, at opposite ends thereof for bearing against the top of the adjacent slip 7 and the top of jaw 2, respectively.

The wedge 25 is adapted to slide across the pin 19 and to prevent any binding of the wedge between the head 24 of the pin and the adjacent lug 20 it is desirable to provide a bushing 30 on the pin which may be compressed between the head 24 of the pin and the lug 20. Bushing 30 is of slightly greater length than the thickness of the wedge 25 so that the latter is free to slide on the bushing 30.

The upper surface 33 of the jaw 2 on which the foot 29 of wedge 25 rides is inclined upwardly and inwardly whereas the wedge 25 is so dimensioned that when the feet 28 and 29 are resting upon the inclined surface 33 the axis of the slot 26 may be substantially horizontal so that if the wedge 25 is pushed inwardly from the outermost position, in which the bushing 30 occupies the inner end of slot 26, to innermost position, in which the bushing 30 occupies the outer end of slot 26, the wedge rotates slightly about the bushing 30 to depress the foot 28 and wedge it tightly against the top of the adjacent slip 7 (it being assumed, of course, that the slip has been previously set, since when the slips are not set they occupy a position extending above the tops of the jaws so that the wedge 25 could not be moved into innermost position).

In operation, the elevator as described is first placed about a pipe, and the jaws closed and latched. Then the slips are moved downwardly into contact with the pipe against the force exerted by the springs 12, either by pulling outwardly on the handle 17 or by pulling the elevator up against the pipe collar. Then by placing a slight lifting strain on the elevator the slips are carried (by friction with the pipe) into fully set position, after which the slips are locked by moving the wedge 25 inwardly as far as possible. An alternative procedure is to move the wedge 25 into locking position following setting of the slips with the handle 17 but before the weight of the pipe is taken up by the elevator. Where the latter procedure is followed, there may be a little lost motion between the wedge 25 and the slip it engages, after the slips have been fully set by the weight of the pipe. However, the wedge will normally remain in innermost position despite such slight play that may exist so that it will function to prevent appreciable retraction of the slips should the pipe "hang up" while going into the hole.

To facilitate explanation, a particular construction of elevator to which the invention may be applied has been described in some detail. It is obvious, however, that the locking device described may be employed on elevators of other construction than that described and the invention is therefore to be limited only as set forth in the appended claims.

I claim:

1. A slip type elevator comprising an annular body member, downwardly and inwardly inclined slip seats on the inner face of said member, slips slidably mounted on said slip seats for movement between upper or retracted positions and lower or set positions, and releasable holding means for preventing retraction of said slips out of set position, said holding means comprising a locking member slidably supported on said body member for movement from an outer position in which it is out of the path of movement of one of the slips into an inner position in which a portion of the member rests upon the top surface of a portion of the slip when the latter is in set position.

2. A slip type elevator comprising an annular body member, downwardly and inwardly inclined slip seats on the inner faces of the said member, slips slidably mounted on said slip seats for movement between upper or retracted positions and lower or set positions, spring means yieldingly supporting the slips and normally maintaining them in upper or retracted position, and releasable holding means for preventing retraction of said slips out of set position, said holding means comprising a locking member slidably supported on said body member for movement from an outer position in which it is out of the path of movement of one of the slips into an inner position in which a portion of the member rests upon the top surface of a portion of the slip when the latter is in set position.

3. A slip type elevator comprising jaws, means to releasably secure the jaws in closed position, downwardly and inwardly inclined slip seats on the inner faces of said jaws, slips slidably mounted on said slip seats, spring means yieldingly supporting the slips and normally maintaining them in upper or retracted position, manually operable means for setting said slips, pin means above one of said jaws and means for supporting said pin means from said jaw, wedge means

having a slot therein through which said pin extends, said wedge means being slidable on said pin from an outer position in which the wedge is outside of the path of movement of one of said slips, into inner position in which one end of the wedge rests upon the top of said slip when the slip is in set position.

4. A slip type elevator comprising jaws, means to releasably secure the jaws in closed position, downwardly and inwardly inclined slip seats on the inner faces of said jaws, slips slidably mounted on said slip seats, spring means yieldingly supporting the slips and normally maintaining them in upper or retracted position, manually operable means for setting said slips, pin means above one of said jaws and means for supporting said pin means from said jaw, wedge means having a slot therein through which said pin extends, said wedge means being slidable on said pin from an outer position in which the wedge is outside of the path of movement of one of said slips, into inner position in which one end of the wedge rests upon the top of said slip when the slip is in set position, said wedge having two feet adjacent opposite ends thereof, one of which rests upon the top of the associated jaw and the other on the upper end of the adjoining slip when said wedge means is in locking position, said one foot being spaced a greater distance below said slot than is said other foot.

5. A slip type elevator comprising jaws, means to releasably secure the jaws in closed position, the inner faces of the jaws being downwardly and inwardly tapered, slips the outer faces of

which are tapered to fit the tapered faces of the jaws, lever means pivotally mounted on one of the jaws for engaging one of the slips to depress the same when the lever is actuated, a pin for supporting said lever, lugs rising from the upper end of said jaws for supporting said pin, and a slip wedging member mounted on said pin, said wedging member having a slot therein through which said pin extends whereby the member is slidable on said pin from an outer position in which it is out of the path of the adjacent slip into an inner position in which its inner end rests upon the top of the slip and its outer end rests upon the top of the jaw.

6. A slip type elevator comprising an annular body member having downwardly and inwardly inclined slip seats on the inner face thereof, slips slidably mounted on said slip seats for movement between upper, retracted position and lower, set position, spring means yieldingly supporting the slips and normally maintaining them in upper position, manually operable means for setting said slips, and manually releasable holding means for preventing retraction of said slips out of set position, said holding means comprising a locking member slidably supported on said body member for movement from an outer position in which it is out of the path of movement of one of the slips into an inner position in which a portion of the member rests upon the top surface of a portion of the slip when the latter is in set position.

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