L. ATWOOD.

STOP DEVICE FOR PLUNGER ELEVATORS.

APPLICATION FILED AUG. 10, 1908.

1,005,132. **Patented Oct. 10, 1911.**

Fig. 1.

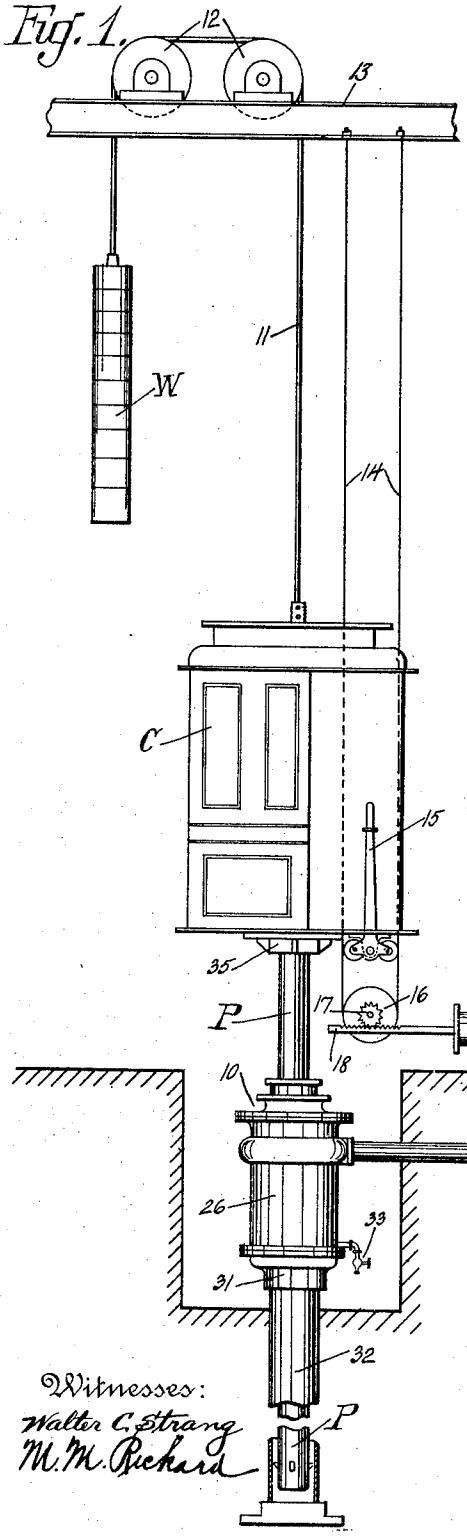
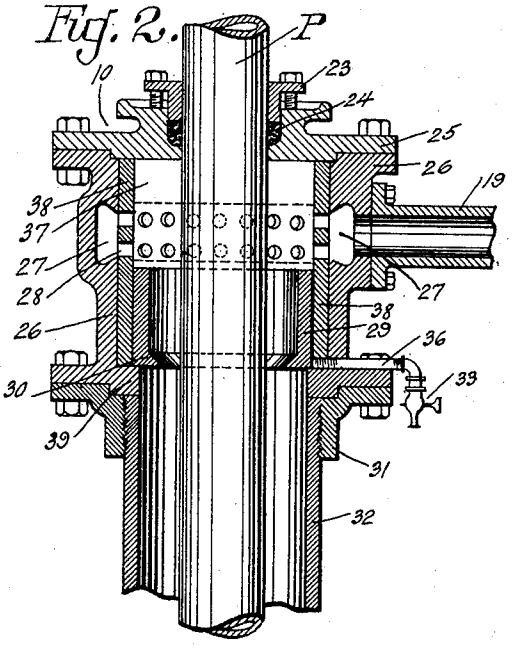
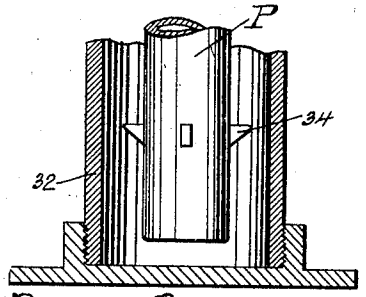


Fig. 2.





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STOP DEVICE FOR PLUNGER-ELEVATORS.

1,005,132. Specification of Letters Patent. **Patented Oct. 10, 1911.**

Application filed August 10, 1908. Serial No. 447,842.

To all whom it may concern:

Be it known that I, LEONARD ATWOOD, a citizen of the United States, residing at Farmington Falls, in the county of Franklin and State of Maine, have invented a new and useful Improvement in Stop Devices for Plunger-Elevators, of which the following is a specification.

My invention relates to improvements in plunger elevators, and has for one of its objects the provision of automatic means for limiting the upward travel of the plunger and its connected elevator car.

A further object of my invention is the provision of means for conveying fluid under pressure into the plunger cylinder without causing a deflection of the plunger.

Other objects will appear, the novel combinations of elements being pointed out in the appended claims.

In the accompanying sheet of drawings, Figure 1 illustrates in elevation a well known type of plunger elevator apparatus embodying my invention; and Fig. 2 is an enlarged sectional view of certain parts of the apparatus showing the construction and operation of my invention in detail.

Similar characters of reference denote similar parts in both of the figures.

Referring to the drawings, P designates a ram or plunger adapted to travel in a closed cylinder 32 under the action of fluid pressure. A car C is connected by a socket plate 35 to the upper end of the plunger P and travels therewith. A counterbalance weight W is suspended by cables 11 which lead over suitable guide pulleys 12 supported by the overhead beams 13 and are connected to the top of the car C.

20 designates a main valve which effects the operation of the elevator apparatus by connecting the plunger cylinder through the to-and-from pipe 19 either to the pressure supply pipe 21 or the discharge pipe 22. The main valve 20 is controlled from the car by means of a hand lever 15 through the standing ropes 14 which operate to rotate a sheave 16, thereby effecting a movement of the main valve stem through the rack and pinion connection 18 and 17. This arrangement of standing ropes is illustrated merely for the sake of simplicity, as in practice many different arrangements of standing or running rope controllers or other devices are employed for connecting the car with the parts to be operated. Furthermore, it is the usual practice to employ a pilot valve to effect the movement of the main valve, the pilot valve itself being operated by the controlling means in the elevator car. This pilot valve is not shown in the drawings, since it forms no part of my invention and its construction and operation are well known in the art.

Referring more particularly to Fig. 2, 10 designates a combined cylinder head and stuffing box. This part comprises an internally-threaded socket plate 31 which screws over the upper end of the plunger cylinder 32. To the upper part of this socket plate is bolted a casing 26, which casing forms a chamber 37 having an inside diameter greater than that of the plunger cylinder 32. An annular groove or passage 27 is provided in the casing 26 adjacent to the to-and-from pipe 19. Upon the upper part of the casing 26 a head or cover 25 is bolted, which head contains the usual stuffing box gland 23 and plunger packing 24. The chamber 37 formed by the casing 26 is lined with a close fitting sleeve 38, preferably constructed of brass or other suitable non-corrosive material which is provided with a series of perforations or slots 28 adjacent to the annular groove or passage 27. The combined area of these perforations or slots is preferably substantially the same as the area of the to-and-from pipe 19. A sleeve 29 is fitted to the inside of the lining 38 and arranged to slide freely therein. The lower end of the sleeve 29 has an internal flange 30 whose diameter is somewhat smaller than that of the inside diameter of the plunger cylinder. This sleeve 29 normally rests upon a flange 39 formed in the casing 26, and when moved upwardly by

means to be explained hereinafter the same covers up the perforations or slots 28, thereby preventing any passage of fluid between the to-and-from pipe 19 and the plunger cylinder. The sleeve 29 is of sufficient length to keep the perforations 28 completely covered up when raised to its uppermost position which will be when it engages the head 25. Toward the lower end of the plunger P two or more projections 34 are arranged for the purpose of engaging the internal flange 30 of the loose sleeve 29 when the plunger reaches its normal upper limit of travel. These projections may be of any desired form, such as a band or ring or enlargement of the plunger itself, or may be separately attached projections as herein shown. Whatever device of this character is used, it should be secured to the plunger at such a location that the loose sleeve 29 will be engaged thereby when the plunger substantially reaches its upper limit of travel, and at the same time it should not unduly restrict the free passage of fluid in either direction.

36 is a small pipe connection between the lower part of the chamber 37 and the relief cock 33, which latter is normally closed.

I will now point out the operation of the apparatus just described, and at the same time show its practical advantages.

As the hand lever 15 in the car is moved into its up position, the main valve 20 is operated to connect the pressure supply pipe 21 and the to-and-from pipe 19. Now, in order for the fluid under pressure to enter the chamber 37 and plunger cylinder 32, it must flow around the annular passage 27 and through the perforations 28, and, owing to the relatively small size of these perforations, the flow is evenly distributed around the circumference of the plunger. In this manner the fluid pressure is not confined to any one side of the plunger and there is no tendency for the latter to be deflected or moved out of the central position with respect to the plunger cylinder and chamber 37. This feature is of importance, since it is the usual practice to direct the incoming flow upon only one side of the plunger which not only tends to throw the plunger out of central position, but also results in excessive wear at the stuffing box and upon the inside of the plunger cylinder.

When the plunger has reached its normal upward limit of travel, the projections 34 near the bottom of the plunger are substantially in engagement with the lower part 30 of the loose sleeve 29. If for any reason the supply of fluid pressure to the cylinder remains unchecked at this time, the plunger will continue to rise and the projections 34 thereon will carry the loose sleeve 29 upwardly, thereby gradually covering up the perforations 28 and completely shutting off the supply and absolutely preventing any further movement of the plunger. This shutting off of the fluid pressure is gradually accomplished, since the loose sleeve first covers up the lower series of perforations and then the upper series, and by staggering these perforations the rate at which the supply is cut off may be regulated as desired. The loose sleeve 29 when in its raised position not only cuts off all fluid supply to the plunger cylinder, but also cuts off the exhaust or discharge as well. In order to restore the apparatus to normal conditions, the relief cock 33 is opened, thereby allowing a small quantity of fluid to escape. The plunger may now move downwardly, allowing the loose sleeve to automatically return into its initial position, uncovering the perforations 28, after which the relief cock 33 may be closed.

When the loose sleeve 29 is light in weight, I sometimes use one or more springs so arranged that they will force the sleeve back into normal position as soon as the projections on the plunger have moved out of engagement therewith.

It is readily seen that my invention effectually prevents the plunger being raised by fluid pressure beyond a certain predetermined limit, and, while I am aware that there are devices intended to accomplish similar results, the present invention is designed to overcome the defects found in such devices by providing a construction which is reliable and certain in action, and inexpensive to install and keep in repair.

My invention consists of but few parts, is easily constructed, and above all is absolutely reliable in its action and not easily gotten out of order.

I desire not to be limited to the precise construction and arrangement of parts herein shown and described, since various changes could readily be made by those skilled in the art without departing from the spirit and scope of my invention.

What I claim as new and desire to have protected by Letters Patent of the United States is:—

1. In a hydraulic elevator, the combination with a car, of a plunger, a cylinder, means for supplying fluid pressure to the cylinder, a valve automatically operable to cut off the supply and escape of fluid pressure when the car has exceeded its normal limit of upward travel, and a relief cock and pipe communicating with the interior of the cylinder.

2. In a hydraulic elevator, the combination with a car, of a plunger, a cylinder, a to-and-from pipe leading to the cylinder, a relief cock and pipe connection leading to the cylinder, a valve normally in position

to close said pipe connection, and means for moving the valve into position to open said pipe connection and also cut off communication between the cylinder and to-and-from pipe when the car moves upwardly beyond its normal limit of travel.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

LEONARD ATWOOD.

Witnesses:
CHAS. M. NISSEN,
JAMES G. BETHELL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."