No. 741,291. PATENTED OCT. 13, 1903.

J. H. ADAMS.

HYDRAULIC ELEVATOR.

APPLICATION FILED JAN. 2, 1903.

NO MODEL.

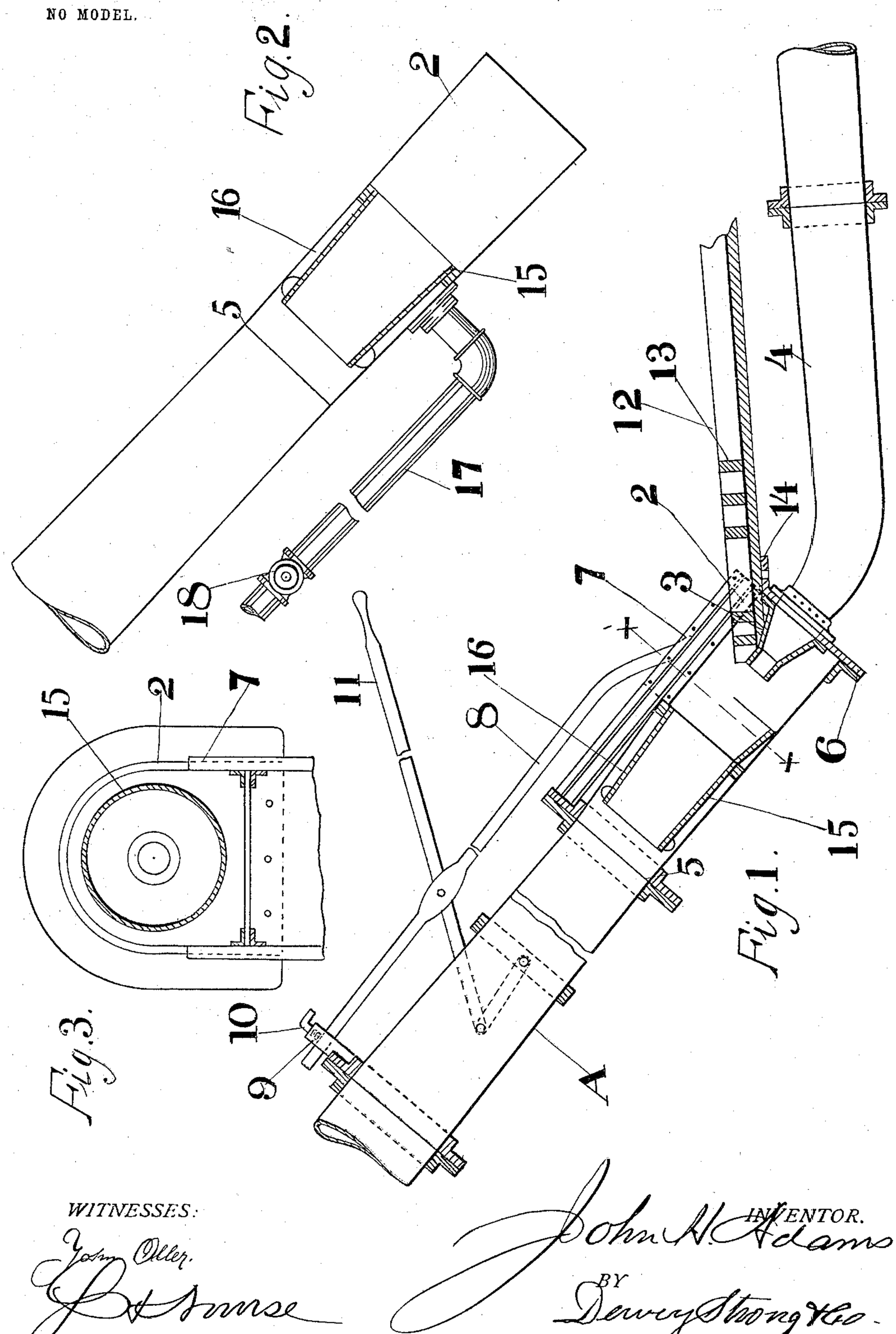

Fig. 1.

Fig. 3.

Fig. 2.

WITNESSES:

John Oller.

L. Dorse

INVENTOR.

John H. Adams

BY

Dewey Strong & Co.

ATTORNEYS

No. 741,291. Patented October 13, 1903.

UNITED STATES PATENT OFFICE.

JOHN H. ADAMS, OF ALAMEDA, CALIFORNIA.

HYDRAULIC ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 741,291, dated October 13, 1903.

Application filed January 2, 1903. Serial No. 137,459. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. ADAMS, a citizen of the United States, residing at Alameda, county of Alameda, State of California, have invented an Improvement in Hydraulic Elevators; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to improvements in apparatus for lifting gravel, tailings, and the like to elevated points by the aid of a jet of water under high pressure delivered into a pipe into which the material to be lifted is brought in such manner as to be acted on and be carried upward by the jet.

It has been found by experience that the hydraulic elevators generally in use are absolutely powerless to relieve themselves if the pit or sump in which they are situated becomes flooded to a depth of over six feet. It is usual to provide drains to carry off the surplus water; but it is not always convenient or practicable or even possible to provide a drain, and if the nozzle gets covered with water and debris it becomes necessary to dig out the nozzle before operation may be resumed. Such a proceeding frequently occasions great and unprofitable loss of time.

The object of my invention is to provide a lift which can be operated no matter to what depth the nozzle may be submerged.

It consists of the parts and the construction and combination of parts hereinafter more fully described, having reference to the accompanying drawings, in which—

Figure 1 is a side elevation and section of my invention. Fig. 2 is a view in partial section showing the air-pipe connection. Fig. 3 is a section of the gate on line $x\,x$, Fig. 1.

A represents the inclined elevator upraise-pipe, through which sand, gravel, tailings, auriferous or other material delivered into a receiver 2 at the lower end of the pipe may be lifted from a point generally on the "bed-rock" to an elevation, whence it is discharged into sluices.

3 is a nozzle situated at the base of the receiver and connected with the main pipe 4. The momentum of the water under high pressure passing through the nozzle is sufficient to carry material which is delivered in juxtaposition to the nozzle out through pipe A.

The height to which these elevators lift and the quantity of material which they may be capable of handling depends upon the head of water at command and the diameter of the parts of the apparatus.

The receiver 2 and the slightly-contracted throat portion 5 of the upraise-pipe are in the present instance made of heavy sheet metal, for it has been found that by reason of the construction about to be detailed the wear in these elevators is very much less than in any other elevator of which I have knowledge. Usually these parts are made of heavy cast metal, which soon wear out and have to be replaced. They are, as a rule, heavy, difficult to handle and transport, expensive in the first instance, costly in maintenance, require considerable time and labor to set up, and are unwieldy once in position.

My apparatus is comparatively light, can be quickly set up or moved from place to place, and is adapted for working, sinking, and cleaning-up purposes.

The nozzle 3, which is here shown as a flanged cone having a discharge-orifice suited to the amount and head of water and character of the material, is bolted to the bottom plate 6 of the receiver. The plate 6 has an opening coincident with the nozzle-opening and also with the opening of the supply-pipe, which latter is bolted likewise to the plate. Thus nozzles of different diameters may be fitted to plate 6, according to the exigencies of the case. It is essential always that the axis of the nozzle should be continuous with the axis of the upraise-pipe A.

The material to be lifted is admitted through an opening in the receiver, which opening is controlled by a gate or valve 7, operated from a point above in any suitable manner. I have shown a slide valve or gate attached to a stem or rod 8, which latter is slidable parallel with pipe A in a guide 9 and is adapted to be locked and held in desired position by a binding-screw, as 10. The raising and lowering of the gate may be effected by means of a toggle-lever 11.

12 is a sluice-section attached to the receiver adjacent to the gate and having a riffled bottom portion 13 projecting through the waste-water opening within the receiver and terminating at a point near the tip of the noz-

zle. The section 12 usually rests on the ground which is being sluiced and has its feed end supported on and bolted to a flange 14 of plate 6. The sluice 12 forms a catchment for the auriferous products freed by the action of "giants" or by other means, which products are thence carried by the water into the receiver, whence it is lifted through the upraise-pipe by the jet from the nozzle.

Within the receiver and above the nozzle and gate-opening is an annular shell 15, having its lower end flared and secured to the walls of the receiver and between which latter and casing is formed an annular air-space 16. This air-space is open at the top and has entering it a pipe 17, through which air may be drawn from the outer atmosphere. A valve 18 controls the admission of air through the pipe.

The controlling-gate 7 and the air-relief mechanism form the essential features of my invention. To illustrate their functions and importance, assume the nozzle end of the elevator to be submerged to a depth of ten or fifteen feet. Ordinary elevators would be inoperative under such conditions, for the inrush of water and debris around the nozzle would choke the action of the jet. As a result the elevator would have to be closed down until the sump or pit could be drained or dug out. With my apparatus, however, the gate 7 is closed whenever the pit becomes flooded. It would remain closed until the lift-water in the elevator had "freed" itself and then would be gradually opened to allow only so much water and gravel to enter as can be handled by the elevator. When the head in pipe 4 is first turned on, if the lower end of the upraise-pipe is closed to all suction, either through the gate or the air-space 16, the water simply flows over the upper end of the upraise-pipe without any force, in consequence of the vacuum formed in the upraise-pipe; but the moment air is admitted to space 16 through pipe 17 the water in the upraise-pipe "frees" itself, as it is said, so that if any rocks, gravel, sand, or water be thenceforth admitted to the receiver they will be carried upward in the manner desired. According as the gate is opened to let in water, sand, &c., the air in pipe 17 is shut off, though not entirely so, until the pit is lowered to a point to allow air to enter with the waste water. Air plays a most important part in hydraulic lifting. In fact, without free circulation of air at least fifty per cent. of the efficiency of the lift is lost. The admission of air in the manner specified renders it impossible for the lift to choke by floods or any unusual flow of gravel and water. Furthermore, it decreases the amount of lift-water needed, cushions the material as it enters the upraise, and consequently there is little or no wear upon the lift. The gate is to keep out undesirable quantities of water and debris. As long as the gate is closed the apparatus has only the weight of its own water to handle. The air-relief mechanism is for the purpose described of freeing the lift-water, so that it will be able to raise the material when called upon to do so. As the lever 11 may be disposed at any convenient height, it becomes practically immaterial how much water and debris may collect in the pit. By proper manipulation of the air-relief mechanism and of the gate it is obvious that the pit may be eventually cleared by the elevator instead of having to shut off the water and shovel out the pit by hand, as is frequently the case with other elevators, entailing often heavy expense and loss of valuable time.

A notable feature of this apparatus and one of great practical importance is the fact of the small amount of wear on the parts. The water column passing through the space inclosed by the shell 15 seems to operate to provide a cushion to protect the shell from the rocks and gravel carried upward by the force of the current. This freedom from wear is attributed in some measure to the extension of the sluice-bottom to a point within the receiver whereby the material is delivered immediately to the jet and over the nozzle, and particularly to the admission of the air in the manner specified.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination in a hydraulic elevator of an upraise-pipe, a water-conducting pipe and a nozzle in axial alinement with the upraise or discharge pipe, the lower end of the latter having an aperture adjacent to the nozzle for the admission of material, and a valve slidably mounted on the outside of the pipe and regulating the size of the aperture.

2. The combination in a hydraulic elevator, of an upraise-pipe, a receiver-section on the lower end thereof, a water-conducting pipe, a nozzle in axial alinement with the upraise-pipe, said receiver having a side opening for the entrance of material, a gate slidably mounted on the outside of the pipe and controlling said opening, and means for operating it from a point above.

3. The combination in a hydraulic elevator, of an upraise-pipe, a receiver-section therefor, a water-conducting pipe, said receiver having a bottom plate closed except for the entrance of water from said conducting-pipe, a nozzle secured to the inner side of said plate, said receiver having a waste-water aperture, and an externally-located sliding gate controlling the waste-water aperture.

4. The combination in a hydraulic elevator, of an upraise-pipe, a receiver-section therefor, a water-conducting pipe and nozzle, said receiver having a waste-water aperture, a gate slidably guided on the exterior of the pipe, an air-chamber formed in the pipe, and means by which air may be admitted independent of the waste-water aperture, to the upraise-pipe to free the lift-water therein.

5. In a hydraulic elevator the combination

with the upraise-pipe, of a receiver-section at the lower end having a closed bottom except for the admission of the lift-water, said receiver having a side opening in its outer wall for the admission of waste water, an exterior longitudinally-slidable closure for said opening, and means including an interior shell spaced from the inner wall of the pipe to form an air-chamber, by which air may be admitted within the upraise-pipe adjacent to the lift-water inlet.

6. A hydraulic elevator consisting in combination of an upraise-pipe, a receiver, a bottom plate for the latter having a lift-water inlet, and a projecting top flange, a nozzle secured to the inside of said plate coincidently with said inlet, a water-conducting pipe, said receiver having an opening at the side, an exterior, longitudinally-slidable gate for said opening and means in conjunction with said gate for regulating the size of said opening from a point above, a sluice-section having a bottom section projecting through said opening into juxtaposition with the nozzle, and supported upon the top flange of the said bottom plate, and an air-relief mechanism for freeing the lift-water when the gate is closed.

In witness whereof I have hereunto set my hand.

JOHN H. ADAMS.

Witnesses:
S. H. NOURSE,
JESSIE C. BRODIE.