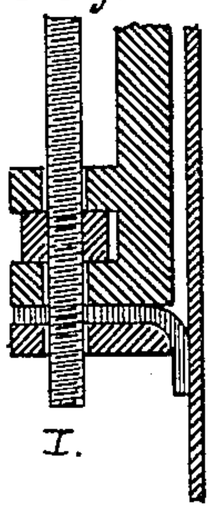
(No Model.)

G. W. CRANSTON & B. WILLSON.

HYDRAULIC GRAVEL ELEVATOR.

No. 246,372. Patented Aug. 30, 1881.

Fig. 3.



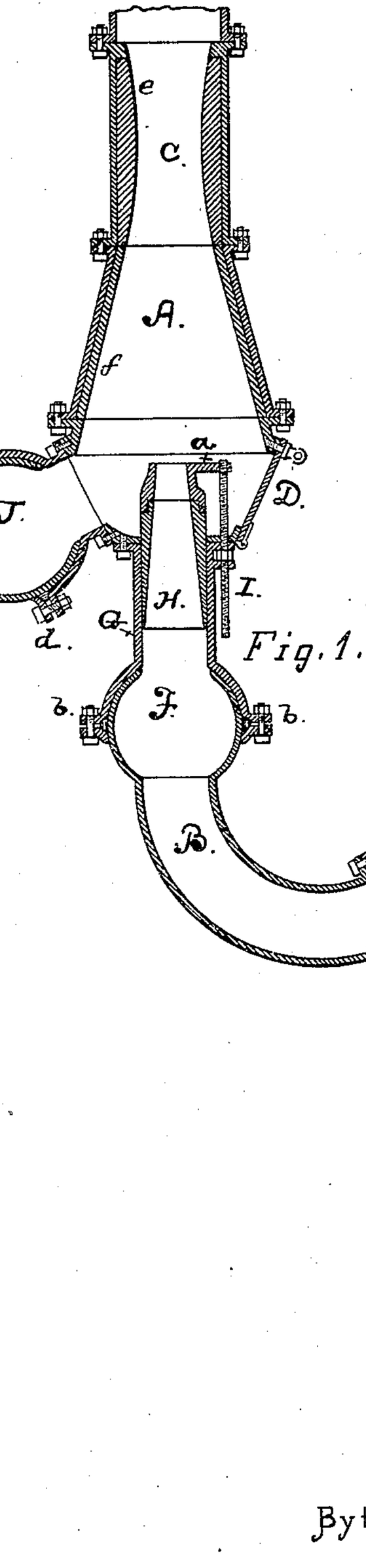


Fig. 1.

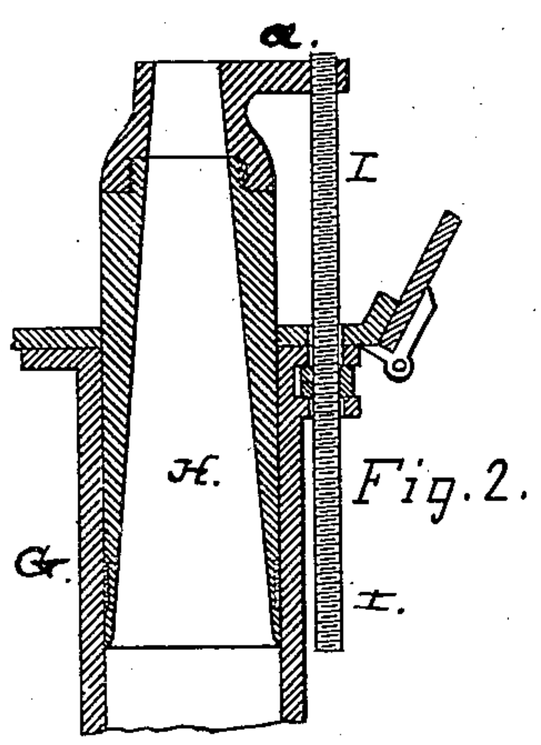


Fig. 2.

Witnesses:

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By their Attys., Poore & Bacon

N. PETERS. Photo-Lithographer. Washington, D. C.

UNITED STATES PATENT OFFICE.

GEORGE W. CRANSTON AND BENJAMIN WILLSON, OF SAN FRANCISCO, CALIFORNIA; SAID CRANSTON ASSIGNOR TO THE HYDRAULIC ELEVATING GRAVEL MINING COMPANY, OF SAME PLACE.

HYDRAULIC GRAVEL-ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 246,372, dated August 30, 1881.

Application filed December 20, 1880. (No model.)

To all whom it may concern:

Be it known that we, GEORGE W. CRANSTON and BENJAMIN WILLSON, both of the city and county of San Francisco, in the State of California, have invented an Improved Hydraulic Gravel-Elevator; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings.

Our invention relates to an improved machine for raising solid substances from a pit or excavation to a higher level by means of a stream of water projected under pressure through a pipe or tube.

The object of our invention is to provide a machine of the class mentioned that can be adjusted to the various positions required in sinking holes in the bottom of a pit or excavation, and that will reach a large area of surface, when once placed in position, without moving or resetting it.

Our machine also possesses several advantages in construction and arrangement that render it especially useful for handling and elevating in an economical manner auriferous earth and gravel in localities where the nature of the country renders it impossible to work the material through a flume.

These objects and advantages we attain by the construction shown in the accompanying drawings and hereinafter described.

Figure 1 is a vertical section through the part; Figs. 2 and 3 are details of the adjusting devices for the nozzle and sliding joint.

In the drawings, we have represented only the two lower sections of the vertical or upraise pipe. The lower section, A, is made conical or bell shape, so as to form an enlarged chamber, into which the nozzle B projects from below, while the branch pipe leads off from one side of the chamber and nozzle and bends directly downward, as shown.

Inside of the lower bell-shaped section, A, and vertical section C, we place a lining, *e f*, which can be readily removed and replaced when worn out by simply disconnecting the sections which are bolted together and removing the section A from its base or support, to which it is detachably connected, after which the linings may be withdrawn and replaced with new ones. The lining *e* in section C is thickened at its middle, so as to contract the passage through the section for the purpose of producing a partial vacuum and suction in the bell-shaped chamber that will draw the water and solid material up through the branch pipe into the chamber, so that it will be caught and forced upward through the vertical pipe by the stream of water.

On the side of the bell-shaped chamber opposite the branch pipe we make a circular opening which corresponds with the opening leading from the chamber into the branch pipe, and this opening we close by a door, D, which can be readily taken off, when desired, in order to remove any obstruction that may tend to choke the contracted passage in the section C; and as the two openings correspond with each other the branch pipe can be placed on either side and the door or cover secured over the opposite opening.

The water-pipe E, which leads the water to the nozzle, curves upward at its lower end, and is connected by a ball-and-socket joint, F, with a short vertical section, G, which connects with the base of the bell-shaped chamber.

The nozzle H is made independent, so as to slide up and down in the short vertical section G, its bore or interior passage being gradually enlarged toward its lower end, so as to make its lower edge quite thin, thus avoiding any obstruction to the passage of the water.

A screw-rod, I, passes through a tapped hole in the bottom of the chamber, alongside the section G, and its upper end is connected with an arm, *a*, on the upper end of the nozzle, so that by turning this screw-rod on the outside of the chamber the nozzle can be moved up or down, as desired, while the machine is at work. This enables us to increase ordinarily the suction in the chamber, because the nearer the nozzle is approached toward the contraction or upper end of the bell-shaped chamber the greater will be the suction produced.

It is not intended that the ball-and-socket joint F shall be always movable. It is simply

movable for adjusting the water-pipe E when setting the machine, in which case the bolts *b b* are loosened, so as to allow the parts of the joint to move, after which the bolts are tightened, so as to clamp the lower ring on the ball and make the joint rigid.

The suction or branch pipe is made in several sections or joints, and it is connected with the bell-shaped chamber by a ball-and-socket joint, J, which always remains movable, so that the suction-pipe can be moved around in any direction. As before stated, this pipe bends downward, and it is made in two parts, one of which slides in the other in the manner of a telescope, so that its lower end can be dropped down to a considerable distance below the machine. In the present instance we have represented bolts *d d*, arranged on each side of the telescopic parts and passing through suitable lugs, by means of which the lower or movable part of the suction-pipe can be raised or lowered, as desired.

From this description it will be seen that the suction-pipe is flexible, adjustable, and extensible. It can be moved around so as to reach to a considerable distance from the machine in each direction, and thus made to move a large amount of material without moving the machine.

By constructing the suction-pipe of a number of short sections we can increase or diminish its length by removing one or more sections or adding one or more sections to its length, either of which operations can be done in a very short time and without trouble.

In setting the machine we first place it upon the spot in the pit or excavation where the work is to be done with its upraise or vertical pipe extending upward to the upper level to which it is desired to raise the solid material. Before doing this we loosen the ball-and-socket joint F, so that the water-pipe E shall adjust itself to the position of the machine, and after the machine has been set we tighten the bolts, so as to make the joint rigid. We then secure the machine to suitable timbers, which are placed horizontally on the ground on each side of it, so as to make its position firm and solid. The stream of water is then turned on through the pipe E and nozzle H, and is projected upward through the vertical pipe. The stream, in passing through the contracted opening in the section C, will create a partial vacuum in the bell-shaped chamber below, with which chamber the branch or suction pipe is connected. The suction-pipe is then lowered or moved about, as desired, against the material to be raised, and the suction draws up the material into the chamber, where it is caught by the stream and carried upward through the vertical pipe or tube. In case the work to be done is surface work, we can remove the suction-pipe entirely and connect a sluice with the opening with which the suction-pipe connects, so as to run the material directly into the chamber.

This machine possesses all the features and advantages necessary to make a complete mining-machine for sinking, excavating, and working surface material.

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

1. The conical or bell shaped section A, provided with removable lining *f*, in combination with the detachable and vertical upraise-pipe C, having lining *e* convex upon its interior, substantially as and for the purpose set forth.

2. The independent nozzle H, formed with a tapering bore or passage, and provided at its upper end with an arm, *a*, in combination with the screw-rod I, substantially as and for the purpose described.

3. The conical or bell shaped section A, provided with door D, in combination with the adjustable nozzle H and suction or branch pipe, substantially as and for the purpose described.

4. The upraise or vertical pipe C, provided with a bell-shaped chamber at its lower end and an adjustable nozzle, H, arranged below and in line with the center of the chamber, said chamber being provided with two corresponding openings, one on each side of the nozzle, with one of which openings a suction-pipe is connected, while the other is closed by a removable door, substantially as above specified.

5. In a hydraulic gravel-elevator constructed with a bell-shaped chamber at the lower end of its vertical or upraise pipe, and provided with an adjustable nozzle, H, arranged to slide in a stationary section, G, below and in line with the center of the bell-shaped chamber, the water-pipe E, having its lower end bent upward and connected with the lower end of the stationary section G by a ball-and-socket joint.

6. The combination, with a hydraulic gravel-elevator, of a suction-pipe made of short sections bolted together, one portion of which is arranged to slide telescopically in the other, substantially as and for the purpose described.

In witness whereof we have hereunto set our hands and seals.

GEORGE W. CRANSTON. [L. S.]
BENJAMIN WILLSON. [L. S.]

Witnesses:
EDWARD E. OSBORN,
WM. F. CLARK.