(No Model.)

# R. STONE.

## HYDRAULIC EXCAVATING MACHINE.

No. 281,415. Patented July 17, 1883.

Fig. 1.

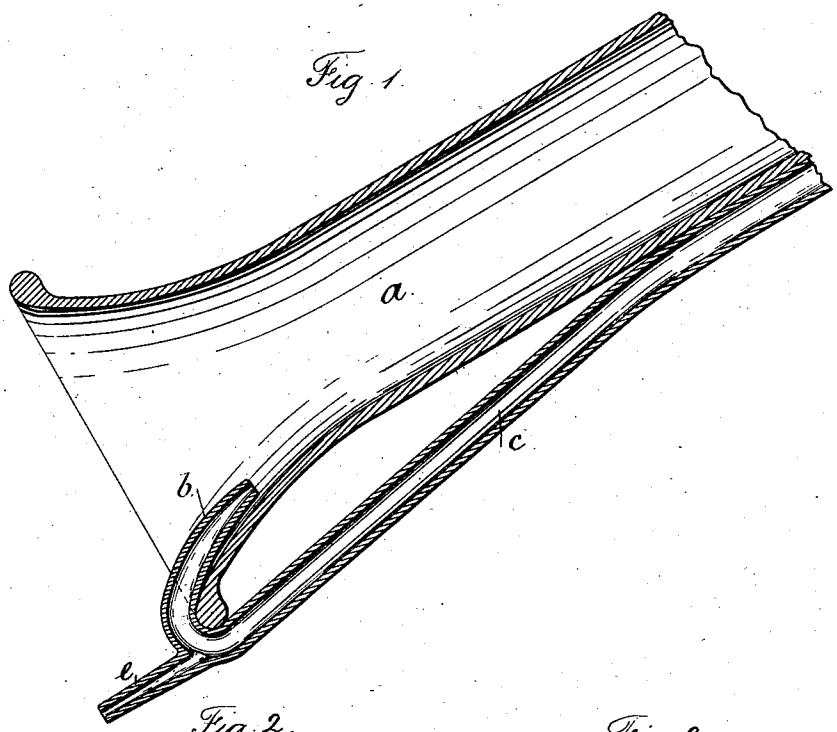



Fig. 2.

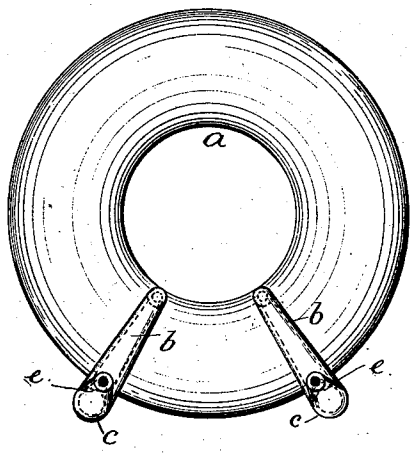
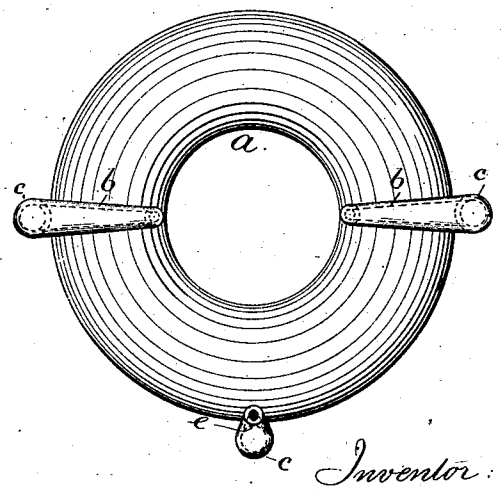



Fig. 3.




Witnesses:
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# UNITED STATES PATENT OFFICE.

ROY STONE, OF NEW YORK, N. Y.

## HYDRAULIC EXCAVATING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 281,415, dated July 17, 1883.

Application filed October 20, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, ROY STONE, of the city and State of New York, have invented an Improvement in Hydraulic Excavating-Machines, of which the following is a specification.

In Letters Patent No. 224,309, granted to me, there is an induction-tube in which a current is set up by water issuing from a jet-nozzle in an upward direction, and a boring-jet in front of the end of the tube.

My present invention is for producing the required current in the induction-tube and for preventing the nozzle obstructing the free passage through that tube of any substances that may enter the same; also, for allowing the induction-tube to be used in shallow water, and for directing the boring-jet upon the earth, sand, or other loose material to the best advantage, so that such materials will be taken up by the flow of water.

In the drawings, Figure 1 is a section of the lower end of the induction-tube, longitudinally. Figs. 2 and 3 are end views, indicating the places where the jet-tubes are located.

The induction-tube *a* is to be of a suitable length and diameter, according to the use to which it is applied, and it is to be suspended and moved in any of the modes shown in my previous applications or patents. Instead of the lower end of the tube being of the same diameter as the body, I make the same flaring, in order to furnish the required space for the introduction of one or more jet-nozzles, *b*, around its periphery, which nozzles are curved around from the supply-pipe *c*, and deliver the water in a powerful upwardly-acting jet within the induction-tube *a*. The boring-jet nozzle *e* is usually upon the same pipe, *c*, at the bend or return-nozzle, so as to deliver a portion of the water against the bank of sand, gravel, or other material to loosen the same.

The advantages of this construction are many:

First. The two jet-nozzles are upon one water-supply pipe that is not necessarily attached to the induction-tube, and hence may be moved in its relative position to the induction-tube. It may be at the bottom or more or less at the side of the end of the induction-tube.

Second. Two or more of these water-pipes, with the two jet-nozzles, may be used, as shown in Fig. 2, so as to loosen and take up the material at opposite parts of the flaring mouth.

Third. In case of any large lumps of earth or sandy material being drawn into the flaring mouth, they will be acted upon and further disintegrated by the upwardly-acting jet or jets.

Fourth. The jet-nozzles can be used with induction-tubes of various sizes without material change, and simply require to be strapped or otherwise held in place at the end of the tube.

Fifth. The flaring mouth allows the jet nozzle or nozzles to be hooked upon its edge, and where the water is not as deep as the width of the mouth the induction-current will still be set up when the nozzles are placed so as to act below the water-level.

Sixth. One or more induction-nozzles can be connected with the end of the induction-tube, as seen in Fig. 3, with a separate boring-jet nozzle, the nozzles in all instances not obstructing the ingress of materials to the induction-tube.

I do not claim an induction-tube having a curved or hopper-shaped end and a jet-tube, as these have been used; but in practice there is considerable loss of power in forcing the water, sand, and other materials around the curve.

I do not claim an ejector-tube and an annular discharge for water under pressure, as the same has been used; but, the opening being very long and narrow, there is considerable friction to retard the flow. Neither do I claim an induction-tube with a curved shoe at the lower end that is larger than the tube, and in which there is a jet-tube. In this case the jet of water, instead of acting in line with the eduction-tube, is projected against the curved shoe, and fails to induce a powerful upward current, because considerable of the force of the jet is lost by striking against the side of the shoe. Neither do I claim an eduction-tube with a flaring end and a jet-tube attached by a swivel, so as to be moved and guided by handles or cross-bars, as this is liable to be misplaced when in use. In my improvement

the jet-nozzle is fixed in the proper position, and the induction-tube and jet-nozzle become one implement, to be handled as a whole.

I claim as my invention—

1. The combination, with a straight induction-tube with a flaring inlet end, of a water-supply pipe, an inducing jet-tube passing around the lower end of the induction-tube, and a boring-jet tube, substantially as set forth.

2. The combination, with the water-supply tube and one or more induction and boring nozzles, of an induction-tube having a flaring lower end, substantially as set forth.

Signed by me this 14th day of October, A. D. 1882.

ROY STONE.

Witnesses:
GEO. T. PINCKNEY,
WILLIAM G. MOTT.