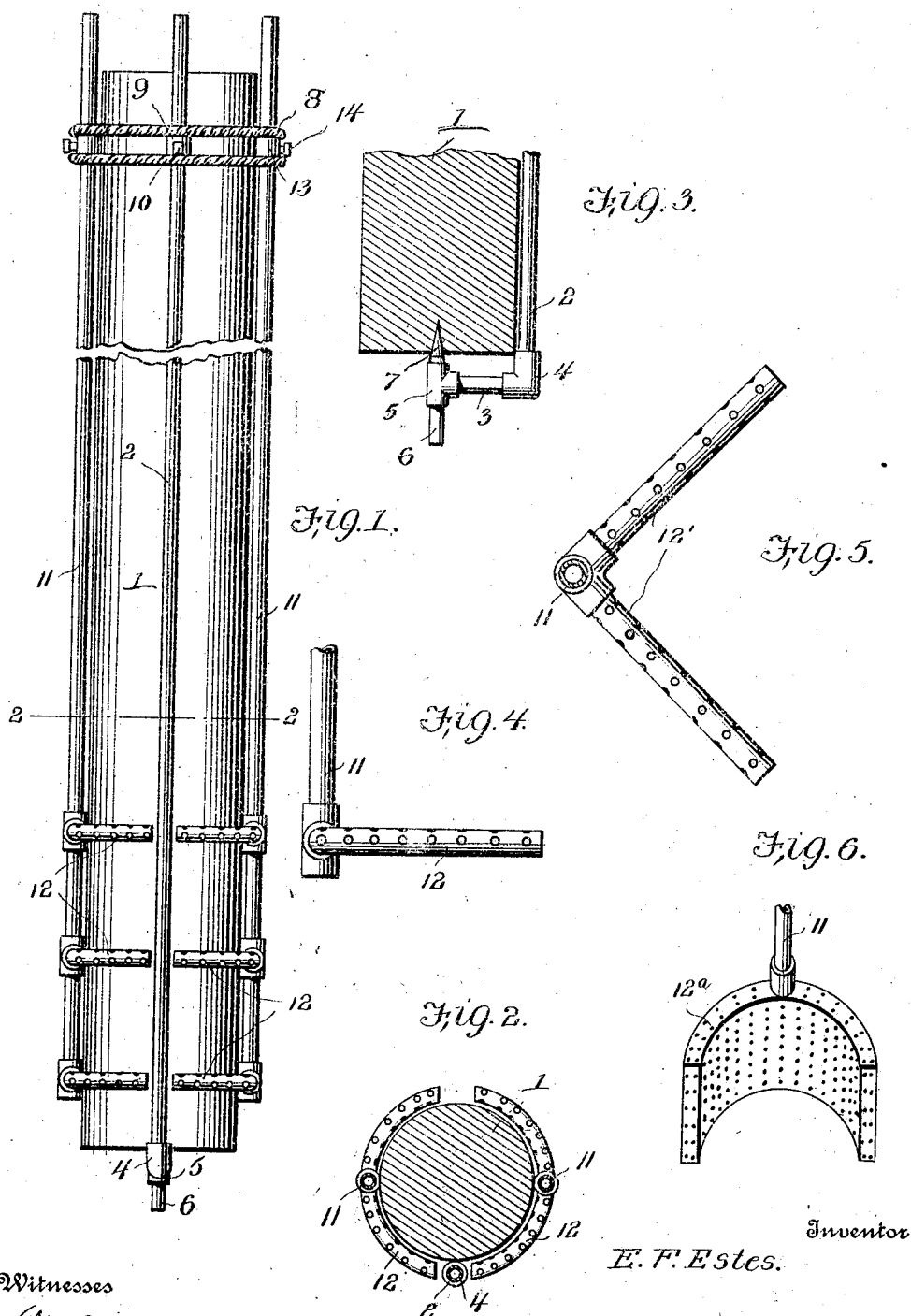


E. F. ESTES.
BORING OR EXCAVATING APPARATUS.
APPLICATION FILED AUG. 31, 1912.

1,065,229.

Patented June 17, 1913.



Witnesses
William Smith.

W. C. Hines

Inventor
E. F. Estes.

By *Victor J. Evans*
Attorney

UNITED STATES PATENT OFFICE.

ELMER F. ESTES, OF LINCOLN, NEBRASKA.

BORING OR EXCAVATING APPARATUS.

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Specification of Letters Patent.

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Application filed August 31, 1912. Serial No. 718,075.

To all whom it may concern:

Be it known that I, ELMER F. ESTES, a citizen of the United States, residing at Lincoln, in the county of Lancaster and State of Nebraska, have invented new and useful Improvements in Boring or Excavating Apparatus; of which the following is a specification.

This invention relates to means for boring or excavating the earth for the reception of piles or other bodies; the primary object of the invention being to provide means whereby piles or other objects of wood, concrete or other materials may be driven or sunk into the earth to a desired or maximum depth without injury and within a minimum period of time, and also without the necessity of forming the excavating means within or as a part of the pile or other object to be embedded.

A further object of the invention is to provide means whereby the bore may be formed and simultaneously flushed to remove the excavated material, so as to prevent such material from packing or adhering to the pile or other object and causing a resistance to its descent; and also to provide excavating tools or devices which may be inexpensively constructed of standard materials.

The invention consists of the features of construction, combination and arrangement of parts hereinafter fully described and claimed, reference being had to the accompanying drawings, in which:—

Figure 1 is a view showing the application of the boring and flushing devices to a round pile. Fig. 2 is a horizontal transverse section on the line 2—2 of Fig. 1. Fig. 3 is a view showing in vertical section the lower end of the pile and nozzle of the boring device applied thereto. Fig. 4 is a view of a simple form of flushing device. Figs. 5 and 6 are views of other forms of flushing devices.

Referring to the drawings, 1 designates an object to be sunk or embedded, such as an ordinary round pile, to which I have shown applied my improved hydraulic boring and flushing devices. As shown, the boring device comprises a pipe or conductor 2 extending in parallel relation to the pile and provided at its lower end with a lateral extension 3 preferably connected therewith by an ordinary L-coupling 4. The extension 3 carries a delivery or boring nozzle formed

of a T-coupling 5 having a nozzle proper 6 fitted into the lower end thereof and a pointed plug 7 fitted into the upper end thereof, which plug is adapted to form an anchor and to be driven into the lower end of the pile to support the nozzle below and in advance of the pile for the excavating action. The upper end of the pipe or conductor 2 is designed in practice for attachment to any source of supply of water under the required pressure. For the purpose of maintaining the pipe or conductor in proper position relative to the pile, a rope or other suitable lashing 8 is employed in connection with an adjustable stop 9 on the pipe. This stop consists of a sleeve adapted to be secured in position by a set screw 10 and to be engaged by branches of the rope or lashing to hold the pipe against movement. By the use of this adjustable stop a conductor of any suitable length may be employed and the stop positioned for securing the same to any length of pile.

In practice a pile fitted with the boring or excavating device, through which a hydraulic jet of high pressure is discharged, is lowered until it comes in contact with the bed of the stream in which it is to be embedded, in which position it is maintained by a suitable anchoring means. A stream of water is then forced through the pipe and nozzle as a result of which the jet of water will cut into the earth below the pile and form an excavation in which the pile will sink under its own weight until, if the pile be of wood, it is buoyed or supported by the body of water of the stream, after which weight may be applied to the pile to force it down until embedded to the desired depth.

In connection with the excavating device I preferably employ a flooding device consisting of a pipe or conductor 11 carrying at its lower end one or more flushing heads 12 and provided with an adjustable stop sleeve 13 having a clamping screw 14, whereby the flushing pipe may be arranged alongside the pile in proper relationship to the excavating pipe and lashed thereto if desired by the same rope.

In Figs. 1 and 2 I have shown the flushing pipe provided with a flushing head of approximately semi-circular form and consisting of curved perforated pipe sections united to the flushing pipe by a conventional form of coupling. A plurality of superposed heads of this type may be em-

ployed, as shown in these views, or a single flushing head may be used, as shown in Fig. 4, depending upon the amount of water required to flush the bore under different conditions. A single flushing device having any suitable number of flushing heads of proper form and construction or two or more flushing devices, may be used, and in the use of two or more flushing devices the flushing heads may be of a form and so arranged as to encircle the pile, as illustrated in Figs. 1 and 2. Where the pile or other object to be driven is of square or rectangular form in cross section, the flushing pipe 11 may be provided with a V-shaped or other angular form of flushing head 12', as shown in Fig. 5 or in the use of the device in connection with piles or objects of different forms a flushing leg 12^a consisting of a perforated body, as shown in Fig. 6 may be employed, which leg will be of a form to inclose or partially inclose the pile or object.

During the operation of sinking the pile water in suitable volume and under sufficient pressure is forced into the bore or excavation about the pile and at a suitable elevation above the boring device, by which means the bore is flushed or flooded with water under pressure acting to loosen up and discharge the sand, earth or other material dislodged by the excavating device. The bore is thus cleared of the excavated material, thus preventing such material from choking the bore or adhering to the pile or object and causing a resistance to its descent. The use of this flooding device is especially desirable and valuable in driving piles or other bodies through sand or silt, which tends to pack under and about the pile, and also facilitates the sinking of piles and other objects in earthy matter of all kinds.

After the pile or object is embedded to the desired depth, the flushing device is detached and pulled up, after which the pipe 2 is tapped with a hammer or other tool with sufficient force to loosen the anchoring point 7, when the pipe is turned by a suitable tool to bring the nozzle to a position clear of the pile, whereupon the excavating device may be readily and conveniently withdrawn.

By the use of my improved hydraulic excavating and flushing devices, wooden or concrete piles, or other bodies of these and other materials, may be driven or sunk into the earth above or below the surface of water in a ready, quick and convenient manner, and by supplying a concentrated jet of water through the excavating nozzle at high pressure, earth of any character, except that impenetrable by a hydraulic blast, may be rapidly excavated at a great saving of time and labor over the ordinary process of mechanically driving the pile or object. Also by the use of my improved appliances wooden, concrete and other similar objects

may be embedded without injury thereto. Another advantage of my invention resides in the fact that the appliances may be used in connection with existing and conventional types of piles and other objects without the necessity of specially constructing such piles or objects for the purpose or of making the hydraulic excavating means as a part of the pile or object itself. Preferably the devices are so constructed that they may be made of standard pipes and fittings, with resultant economy.

I claim:—

1. A hydraulic excavating apparatus comprising a conductor, and an excavating nozzle carried by said conductor and provided with a spur for detachably engaging the object to be embedded.

2. A hydraulic excavating apparatus comprising a conductor, an excavating nozzle carried by said conductor and provided with a spur for detachably engaging the object to be embedded, and means auxiliary to said spur for externally and detachably connecting the conductor to said object.

3. A hydraulic excavator comprising a conductor adapted to be arranged exteriorly of and parallel with a pile or other object to be embedded, a nozzle carried by said conductor and provided with means for detachably retaining and centering it upon the object, and means for detachably securing said conductor to the object.

4. A hydraulic excavator comprising a conductor adapted to be arranged exteriorly of and parallel with a pile or other object to be embedded, a nozzle carried by said conductor and provided with means for retaining and centering it upon an object, a retaining element adjustably mounted upon the conductor, and fastening means for cooperation therewith to secure the conductor to said object.

5. A hydraulic excavator comprising a conductor adapted to be arranged exteriorly of and parallel with a pile or other object to be embedded, a nozzle carried by said conductor and provided with means for retaining and centering it upon an object, a sleeve adjustable along the conductor and provided with fastening means, and a lashing for cooperation with said sleeve to secure the conductor to the object.

6. In hydraulic excavating apparatus, and in combination with hydraulic means for forming a bore, means independent of and adapted for external connection with the object to be embedded for flooding the bore, said flooding means being constructed to partially embrace said object.

7. In hydraulic excavating apparatus, an excavating device adapted for attachment to the object to be embedded to form the bore in advance thereof, and a flushing device adapted for arrangement upon the object

to flood the bore and discharge the excavated material.

5 8. In hydraulic excavating apparatus, an excavating device adapted for external attachment to a pile or other object to be embedded for forming a bore in advance thereof, and means adapted also for external attachment to the object and to partially embrace said object for flooding the bore and
10 discharging the excavated material.

9. A hydraulic excavating apparatus comprising a conductor provided with an excavating nozzle, a second conductor provided with a flushing device, and means for
15 externally and detachably securing said elements upon the object to be embedded.

10. In a hydraulic excavator, and in combination with an object to be embedded, a conductor adapted to extend parallel with said object and provided with an angular
20 end adapted to extend beneath the object, said angular end of the conductor being provided with a discharge nozzle and a retaining element to detachably engage the object, and means for detachably securing said conductor to the object.

In testimony whereof I affix my signature in presence of two witnesses.

ELMER F. ESTES.

Witnesses:

I. H. HATFIELD,

J. L. PIERCE.