(No Model.)

W. M. CAMPBELL.

APPARATUS FOR FORMING UNDERGROUND DRAINS, &c., IN CEMENT.

No. 260,533. Patented July 4, 1882.

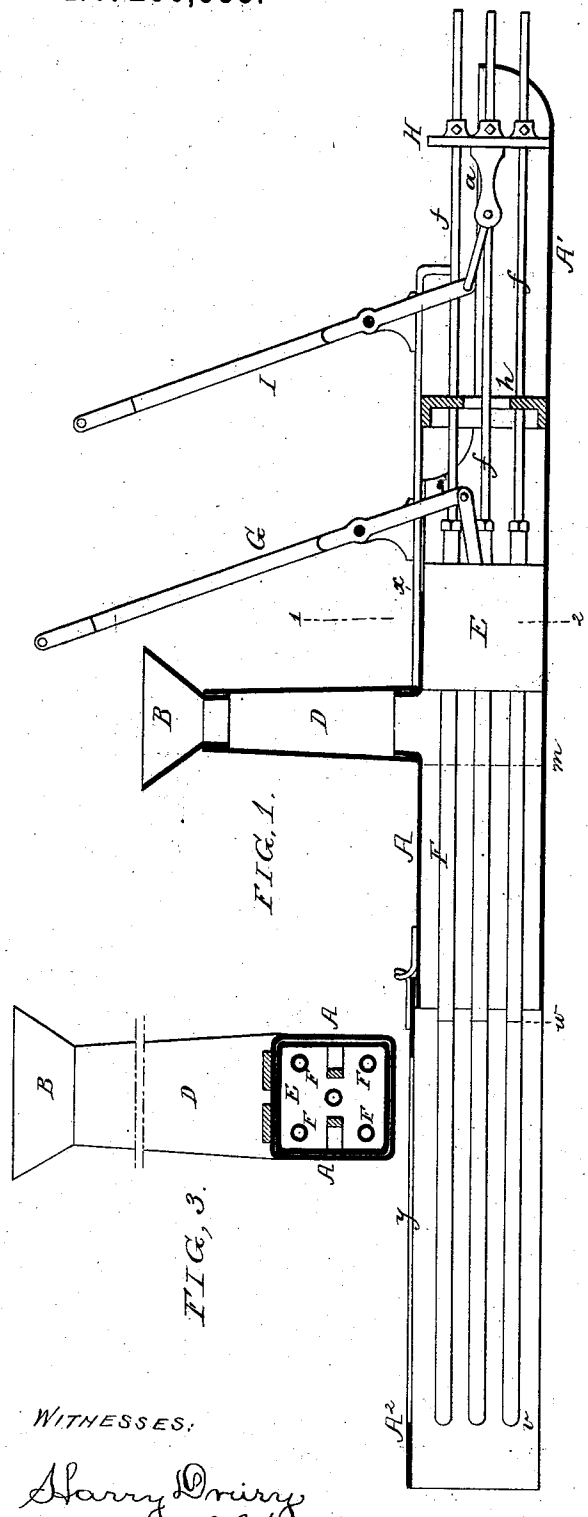


FIG. 1.

FIG. 3.

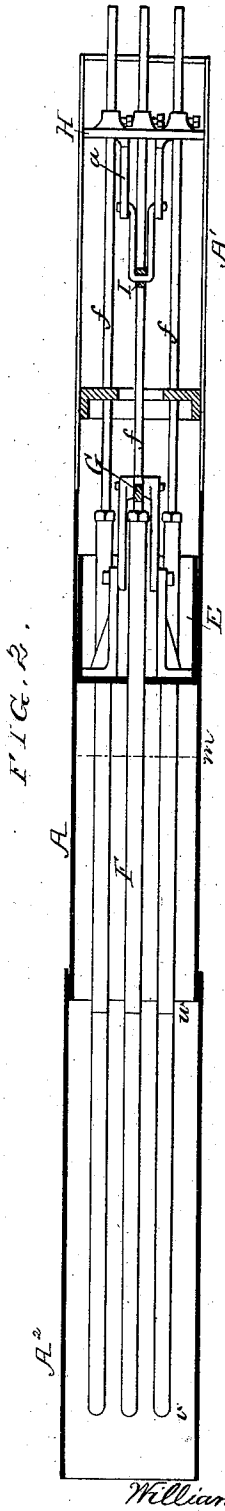


FIG. 2.

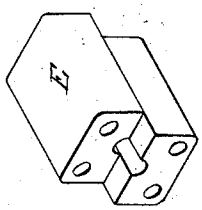


FIG. 4.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR FORMING UNDERGROUND DRAINS, &c., IN CEMENT.

SPECIFICATION forming part of Letters Patent No. 260,533, dated July 4, 1882.

Application filed April 24, 1882. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM M. CAMPBELL, a citizen of the United States, and a resident of Mount Clemens, Macomb county, Michigan, have invented certain Improvements in Apparatus for Forming Underground Drains or Ducts in Concrete, of which the following is a specification.

My invention consists of certain improvements, fully described hereinafter, in apparatus for forming underground continuous pipes of concrete, my invention relating especially to that class of apparatus which is illustrated in Patent No. 220,757, granted October 21, 1879, and in which the tube or casing, the plunger, the former, and the feed-tube advance as the pipe is formed.

The main objects of my invention are to overcome difficulties attending the use of the previous apparatus, and especially to make it available for the formation of a number of ducts in a continuous mass of concrete.

In the accompanying drawings, Figure 1 is a vertical section of the apparatus with my improvements; Fig. 2, a sectional plan; Fig. 3, a transverse vertical section on the line 1 2, Fig. 1; and Fig. 4, a perspective view illustrating a modification of my invention.

A is a case, preferably of sheet-iron, and in the present instance of quadrangular form, and this case is provided with a pipe, D, surrounded by a hopper, B. A piston or plunger, E, of a shape conforming with that of the case, is so fitted within the same that it can be moved to and fro freely, a lever, G, pivoted to stands on the top of the case, being connected by suitable links to the front end of the plunger. A number of cylindrical formers, F—five in the present instance—fit snugly but so as to slide freely in openings in the plunger, these formers being connected by rods *f* to a plate, H, which fits in the front extension, A′, of the case, this extension being open at the top from about the point *x* to the extreme front end.

The rods may be guided by a fixed plate, *h*, secured within the front extension of the casing.

A central projection, *a*, on the plate H is connected by a link to the lower arm of a lever, I, which is pivoted to suitable stands on the case.

To the rear end of the case is detachably connected an extension, A^2, which is open at the bottom, and has in the top one or more openings, *y*, for a purpose explained hereinafter.

We will suppose that the apparatus above described is resting on the bottom of a trench in the ground, that the operating parts are in the condition shown in Fig. 1, and that concrete has been rammed into the case A as far as the dotted line *m*. More concrete having been introduced into the case through the pipe D, the attendant, by means of the lever G, pushes the plunger E rearwardly, and thereby rams the concrete which has been admitted and adds it to that which had been previously rammed. At the same time such force is applied to the lever that the case A and its extensions will be moved forward in the trench to a limited extent. By then operating the lever I the whole of the formers are drawn forward, while the plunger E bears upon the end of the mass of concrete. The plunger is then retracted, more concrete is introduced, and another ramming and another forward movement of the case in the trench take place, and these operations are repeated, the result being the laying in the trench of a continuous mass of concrete, and the formation of five continuous ducts in the mass, the shape of which is defined by that of the case A.

The object of permitting the formers to be operated independently of the plunger is to loosen the said formers from the mass of concrete while the plunger bears upon the latter, the formers being then advanced to the extent necessary to permit another feed, another operation of the plunger, and another forward movement of the case A. The above-described independent movement of the formers, moreover, tends to insure the formation of clean ducts in the concrete.

By the use of the rear extension, A^2, of the case the mass of concrete, although resting in the bottom of the trench, is kept together laterally until it has become partly set, and the opening *y* in the top of the rear extension per-

mits the inspection of the rammed concrete and such additional ramming or troweling of the same as may be deemed necessary.

The trench, it will be understood, is filled in at the rear of the apparatus as the latter advances.

If desired, the plunger may be made in two parts, one above the other, as shown in Fig. 4, each part being operated by a lever separate from that by which the other part is operated. This plan, which permits the two parts to be operated alternately, will be advisable when the continuous mass of concrete is broad and deep and has a large number of ducts.

The apparatus is especially applicable to the forming of underground ducts for telegraph-wires; but it should be understood that it is available for the formation of a single duct or drain in a continuous mass of concrete; and when I refer to "concrete" I wish it to be understood that the term includes any material or composition which will, as the apparatus is advanced, become set or partly set and self-sustaining, and will not lose the shape it has acquired.

The formers are made from their ends *v* to about the point indicated by the dotted line *w* of wood, the remaining portions being of metal; but they should be of the same unvarying diameter throughout. By thus making the outer portions of the formers of wood, sagging, which might interfere with the proper formation of the ducts, is obviated.

In previous apparatus a former has been used which is cone-shaped at or near the point where the concrete is introduced into the case. This I have found to be objectionable, as the best results are attained by a former or formers of the same diameter throughout. I have found, moreover, that a rigid former is more available than a flexible former, such as has been hitherto proposed.

I claim as my invention—

1. The combination of the case A, former or formers F, and plunger E with mechanism whereby the said formers and plunger may be operated independently of each other, substantially as set forth.

2. The combination of the case, plunger, and former or formers with the lever G, connected to the said plunger, and the lever I, connected to the formers, substantially as specified.

3. The combination of the case, plunger, and former or formers with the rear extension, A^2, having an opening in the top, substantially as specified.

4. The combination of the case and plunger with a former or formers made partly of metal and partly of wood, as set forth.

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

WILLIAM M. CAMPBELL.

Witnesses:

HARRY DRURY,

HARRY SMITH.