(No Model.)

W. M. CAMPBELL.

APPARATUS FOR FORMING UNDERGROUND PIPES OF CONCRETE.

No. 272,410. Patented Feb. 20, 1883.

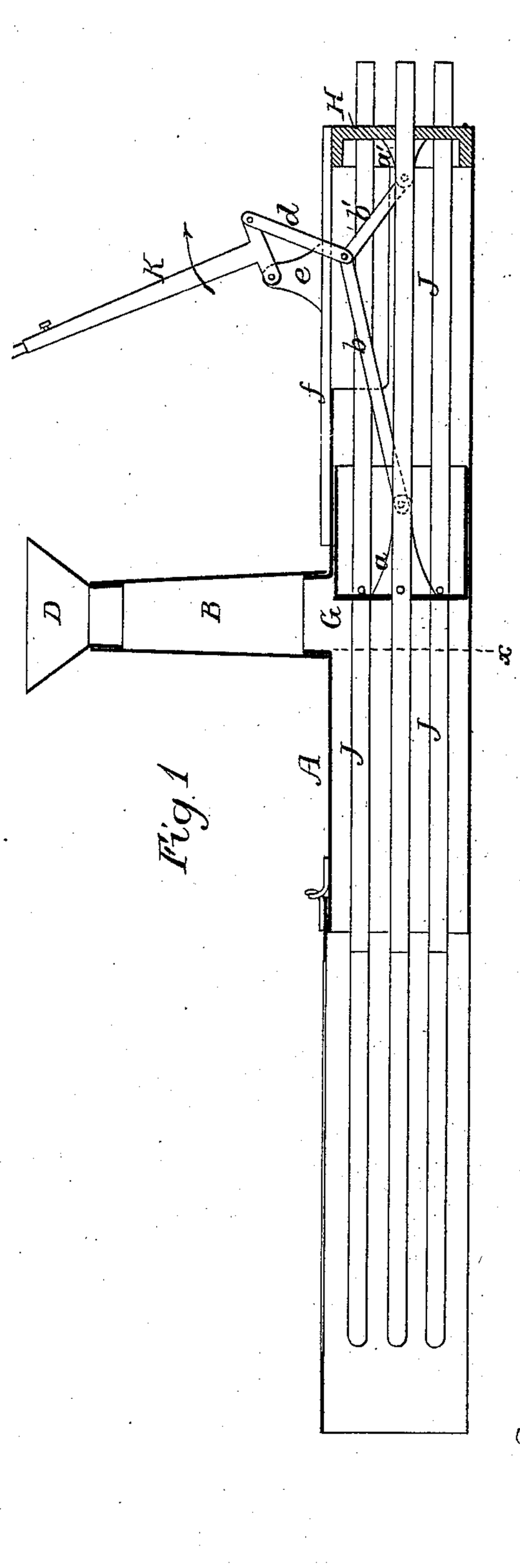

Fig. 1

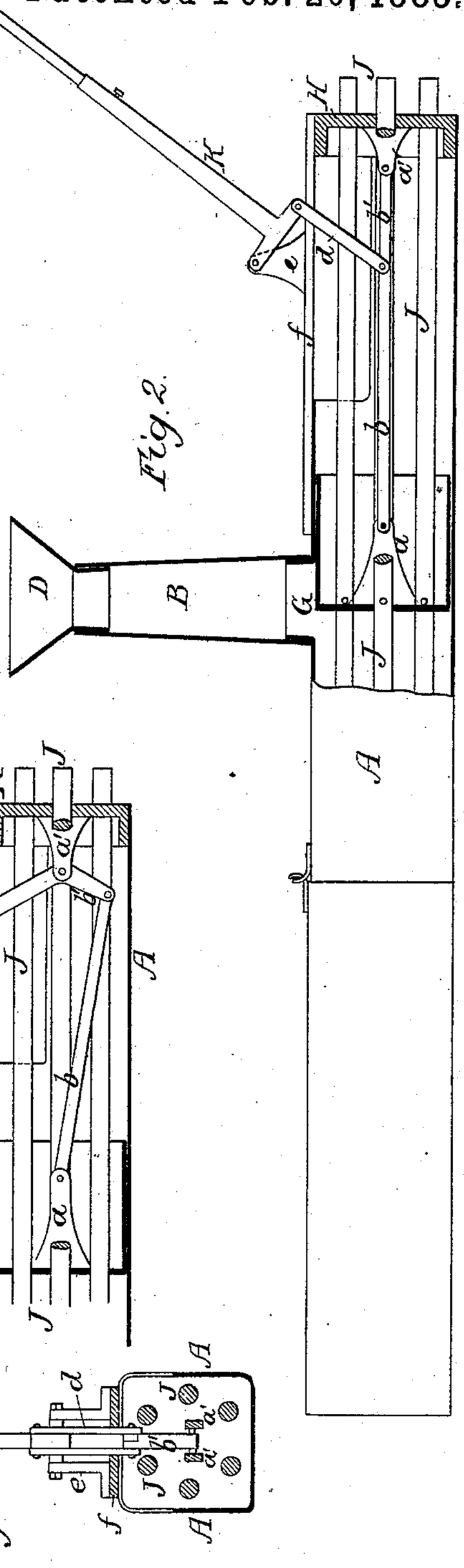

Fig. 2.

Fig. 4.

Fig. 3.

Witnesses.
Harry Drury
Harry Smith

Inventor.
Wm. M. Campbell.
by his attorneys
Howson and Sons.

UNITED STATES PATENT OFFICE.

WILLIAM M. CAMPBELL, OF MOUNT CLEMENS, MICHIGAN, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE NATIONAL CONTINUOUS STONE CONDUIT COMPANY, OF NEW YORK, N. Y.

APPARATUS FOR FORMING UNDERGROUND PIPES OF CONCRETE.

SPECIFICATION forming part of Letters Patent No. 272,410, dated February 20, 1883.

Application filed July 3, 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 an Improvement in Apparatus for Forming Underground Pipes of Concrete, &c., of which the following is a specification.

My invention relates to an improvement in the apparatus for forming underground continuous pipes of concrete or like material, described in Letters Patent of the United States No. 220,757, dated October 21, 1879, and in my application for Letters Patent of the United States filed on the 24th day of April, 1882, the object of my present invention being to insure the effective operation of the apparatus by simpler and cheaper means than those described in my former application.

In the accompanying drawings, Figure 1 is a longitudinal section of the improved apparatus; Fig. 2, the same with some of the parts in a different position; Fig. 3, a transverse section on the line 1 2, and Fig. 4 a view of a modified form of the device.

In Figs. 1, 2, and 3, A is a casing of any desired form, that shown in the present instance being rectangular. From the top of this casing projects a tube, B, surmounted by a hopper, D, and within the casing fits snugly a plunger, G, through openings in which project a series of formers, J, the front ends of which pass through a plate, H, attached to or forming part of the front end of the casing A.

To lugs *a* on the plunger is pivoted one end of a bar, *b*, and to lugs *a'* on the plate H is pivoted one end of a similar bar, *b'*, the opposite ends of said bars *b b'* being connected by a link, *d*, to the short arm of a lever, K, which is pivoted to lugs *e*, carried by bars *f*, the latter spanning an opening in the top of the casing A.

When the long arm of the lever K is moved in the direction of the arrow in Fig. 1 there is a tendency to straighten the toggle-connection formed by the jointed bars *b b'*, and hence a tendency to move the plunger G in one direction and the plate H in the opposite direction. Supposing that the concrete or other cement has been rammed into the casing A, around the formers J, and up to the dotted line *x*, Fig. 1, and that fresh cement has been introduced in front of the plunger G, the first effect of the movement of the lever K is to force the plunger against this fresh mass of cement, and thus compress it against the end of that which has already been rammed, the movement of the plunger being then resisted, so that further movement of the lever K will cause a forward movement of the plate H and casing A. This action is similar to that in the apparatus described in my former application; but in such apparatus two levers were used—one for operating the plunger and the other for operating the plate H. By the use of a single lever for performing both of these duties I am enabled to simplify the construction and reduce the cost of the apparatus.

The formers J are withdrawn from the mass of concrete or cement by the plunger, as the latter is drawn forward after having rammed a quantity of cement into the casing, the plunger striking pins which project from the formers, and the latter sliding in openings in the plate H, the friction between which and the formers is just sufficient to prevent the latter from being carried back by the plunger when its movement is reversed. In this respect the apparatus is somewhat similar to that described in the patent above referred to; but the present apparatus is much more effective than the patented one, owing to the greater force imparted to the plunger G and plate H.

The devices shown for operating the plunger G and plate H can be used with equal advantage in apparatus similar to that described in my former application, in which the formers are carried by the plate H.

In Fig. 4 I have shown a modified form of toggle-connection between the plunger G and plate H, the lever K in this case being hung directly to lugs on the plate, and the short arm of the lever constituting the arm *b'* of the toggle-connection.

I claim as my invention—

The combination of the casing A, a series of formers, J, the plunger G, the plate H, and a toggle-connection between the plunger and plate, all substantially as set forth.

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

WM. M. CAMPBELL.

Witnesses:
HARRY DRURY,
HARRY SMITH.