(No Model.)

G. B. CHRISTIE. J. LOWE & G. A. LEDERLE.

APPARATUS FOR EXCAVATING DITCHES.

No. 521,700. Patented June 19, 1894.

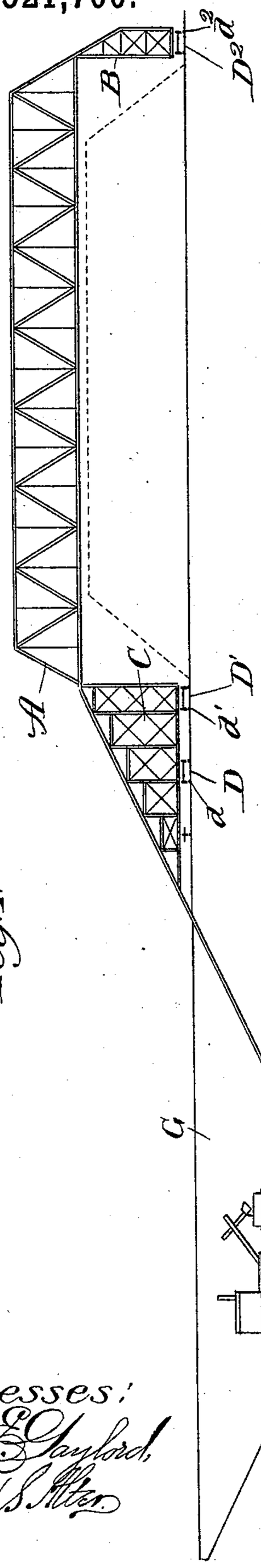

Fig. 1.

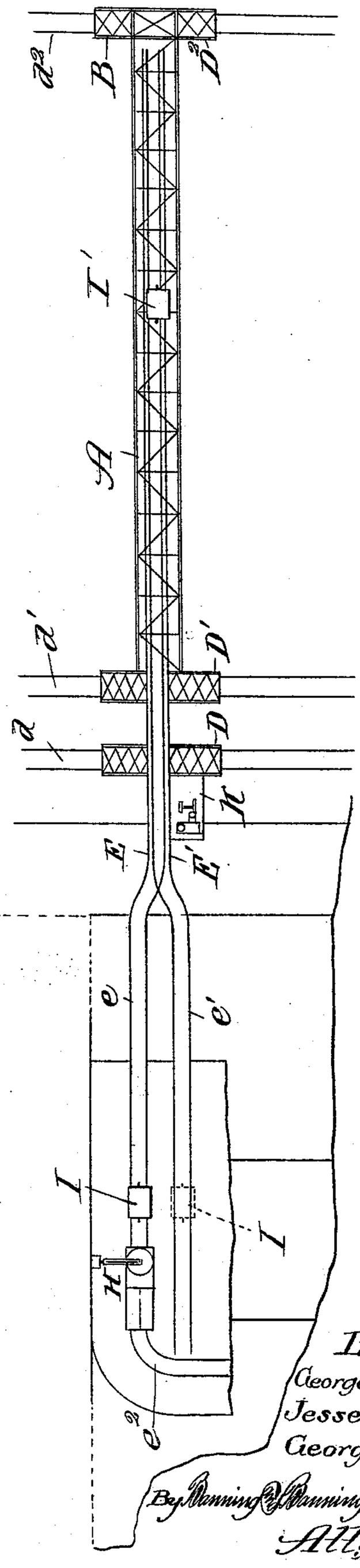

Fig. 2.

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APPARATUS FOR EXCAVATING DITCHES.

SPECIFICATION forming part of Letters Patent No. 521,700, dated June 19, 1894.

Application filed February 20, 1894. Serial No. 500,851. (No model.)

To all whom it may concern:

Be it known that we, GEORGE B. CHRISTIE, JESSE LOWE, and GEORGE A. LEDERLE, of Chicago, Illinois, have invented certain new and useful Improvements in Apparatus for Excavating Ditches, of which the following is a specification.

The object of our invention is to provide a simple, economical and efficient apparatus for excavating ditches, canals, &c.; and to that end it consists in the features and combinations hereinafter described and claimed.

In the accompanying drawings, Figure 1 represents a side elevation of our improvement, showing the method of using it in connection with a canal bed; and Fig. 2 a plan view of the same.

The purpose of our invention is to lessen the labor and expense necessary in the digging of ditches or canals and removing the spoil or waste material therefrom. In the methods now in use, which involve the use of manual, steam or horse power, the labor and expense necessary are enormous.

In excavating ditches and canals, it is well known that where the bed or central portion of the cut extends to any great depth—say, between thirty and forty feet—different strata of material are encountered, so that it is economical to be able to excavate or remove the different strata independently of each other. Again, where in the line of the cut streets have to be crossed, and where rights of way are not secured, it is necessary to leave these portions of the ditch intact until the rest of the ditch has been excavated, then to go back and remove these obstructions or to excavate, as above stated, the remaining stratum. When the different strata are removed independently, the first part, say eight or ten feet, is generally composed of loose material which may be easily removed, and to do such removing light excavators can be used which will only involve comparatively small expense. After the surface or loose material has been removed from the entire length of the cut, it may be advisable to move the excavating apparatus back over the same course and excavate the heavier material or solids. To do this, heavier and more expensive excavators may be used in connection with the same conveyers, in place of light ones which were used for the first or loose material.

In speaking of apparatus for excavating, we do not wish to be in all cases understood as meaning an excavator in the ordinary, technical sense—steam shovel merely—but rather the entire appartus generally, as hereinafter described and explained.

In constructing our improved apparatus, we use a through bridge, A, supported and connected to a tower, B, at one end, and an inclined apron tower, C, at the opposite end, or that end nearest the cut or earth to be excavated. These towers are mounted upon the wheel tracks D, D′ and D², which are supported and adapted to move upon tracks, *d*, *d′* and *d²*, arranged parallel to that portion of the ditch which is to be excavated. The truss or span, A, is provided preferably with two sets of tracks, E, E′, running lengthwise of the structure and up the inclined apron, and arranged with such relation to each other that they form guard rails for each other. These tracks are continued down into the ditch, G, and form tracks, *e*, *e′*, which may be supported in any convenient way upon ties or movable slippers, so that as the cut advances they may be moved or pushed forward and kept in line with the movable span.

In connection with the tracks, E and E′, we use a steam shovel, H, of any of the ordinary constructions, each track being provided with an individual car, I and I′, which are driven up and down the incline, forward and backward upon the movable span by means of a cable—not shown—which is operated from a house or platform, K, containing the necessary engine or motor for operating the cable. These cars are what we term "dump cars," and are moved up and down alternately on their own track, though one track may be used and a switch employed where they cross each other.

We make a movable span of a length sufficient to span the spoil or waste material which is taken out of the excavator and dumped between its supporting towers. We are enabled to do this by using a through bridge, supported by the necessary trestle work, and also to dump the material either through the bridge forward or backward with-

out any regard to the movements of the structure, as the tracks upon which the structure moves are entirely without the area of the spoil bank.

It is of course most economical to excavate the entire width of the canal in one continuous operation, but heretofore there has been no practical way of doing this. On the contrary, it has been customary to make small cuts in the face of the ditch or canal throughout its entire length, the operation being repeated as often as necessary, frequently as many as forty or fifty times. In order to overcome this objection and to provide for excavating the entire width in a single cut, we provide the first track, *e*, in the bed of the cut with a curve of the desired radius, e^2—this curve being preferably at the end of the track—so that the steam shovel mounted on the track may be moved around this curve at the desired radius and excavate the material between the face of the cut and the bank as the track is moved along. This enables the tracks, *e* and *e'*, to be moved in the direction of operation and close to the face of the cut, so that successive operations in the face of the cut may be performed. Without this curve in the track a step by step advancement could only be taken, which would soon block the entire operation of the apparatus.

In using our improved apparatus, the track may be laid and the structure mounted thereon, the excavators started for a short distance—say, to a depth of eight or ten feet, or enough to take out the loose surface material—and the tracks laid in the bed of the cut. The steam shovel is then put in place on the track and the dump cars connected to the operating cable. As fast as one car is filled, the empty car is brought down into position and the loaded car carried up into the movable span and dumped at any point desired between the supporting towers. When the entire length of the cut has been gone over and the surface material removed, the heavier steam shovel or excavator may be put back in the bed of the canal or ditch for the excavation of it to a greater depth, and the movable span moved back over the road it has traveled, excavating the entire length of the cut to the second depth. As many excavations at different depths may be taken as will be advantageous or economical until the bed of the cut has reached the required depth.

In using our structure it is only necessary to use two cars to excavate an enormous quantity of material per day, as no unnecessary travel is required, from the fact that the cars may be dumped either in advance or backward of the movement of the structure.

Some of the other advantages of our invention are, that the traveling span may be moved back and forward over a spoil bank, thus allowing any number of excavations at different depths to be taken; that it reduces to a minimum the amount of cars and operating machinery necessary to remove the excavated material, as the cars travel in the shortest possible distance from their point of loading to their point of discharge; that, the cars traveling in substantially straight lines, there are less tracks to maintain and drainage to provide for, which simplifies the cable system and places the movements of the cars and operations of the hauling machinery under the control of a single operator; and that it provides for excavating the face of the cut for the entire width of the ditch or canal in a single operation.

We claim—

1. In apparatus for excavating ditches, the combination of a span covering the area of a spoil bank, movable towers at each end of the span for supporting and moving it, wheels for supporting the towers, tracks upon which the wheels rest and run, an inclined apron for one of the towers, and a track supported and running only in the longitudinal direction of the apron and span, substantially as described.

2. In apparatus for excavating ditches, the combination of a span covering the area of a spoil bank, movable towers at each end of the span for supporting and moving it, wheels for supporting the towers, tracks upon which the wheels rest and run, an inclined apron for one of the towers, a track supported and running only in the longitudinal direction of the apron and span, a dump car for the track, and means for moving the dump car, substantially as described.

3. In combination with a power excavator mounted on a track within the bed of a cut, a traveling span covering the area of a spoil bank, wheeled towers at each end of the span upon which it is mounted and moved, tracks upon which the towers travel, an inclined apron forming part of the front tower, a track supported by and running only in the longitudinal direction of the apron and span, a dump car for the track, and means for moving the dump car, substantially as described.

4. In combination with a track mounted within the bed of the cut and having a curved portion, a power excavator mounted upon the track for excavating material, substantially as described.

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