No. 708,395.

Patented Sept. 2, 1902.

O. PETERSON & J. H. CLARK.

DEVICE FOR DIGGING DITCHES.

(Application filed Apr. 15, 1901.)

(No Model.)

2 Sheets—Sheet 1.

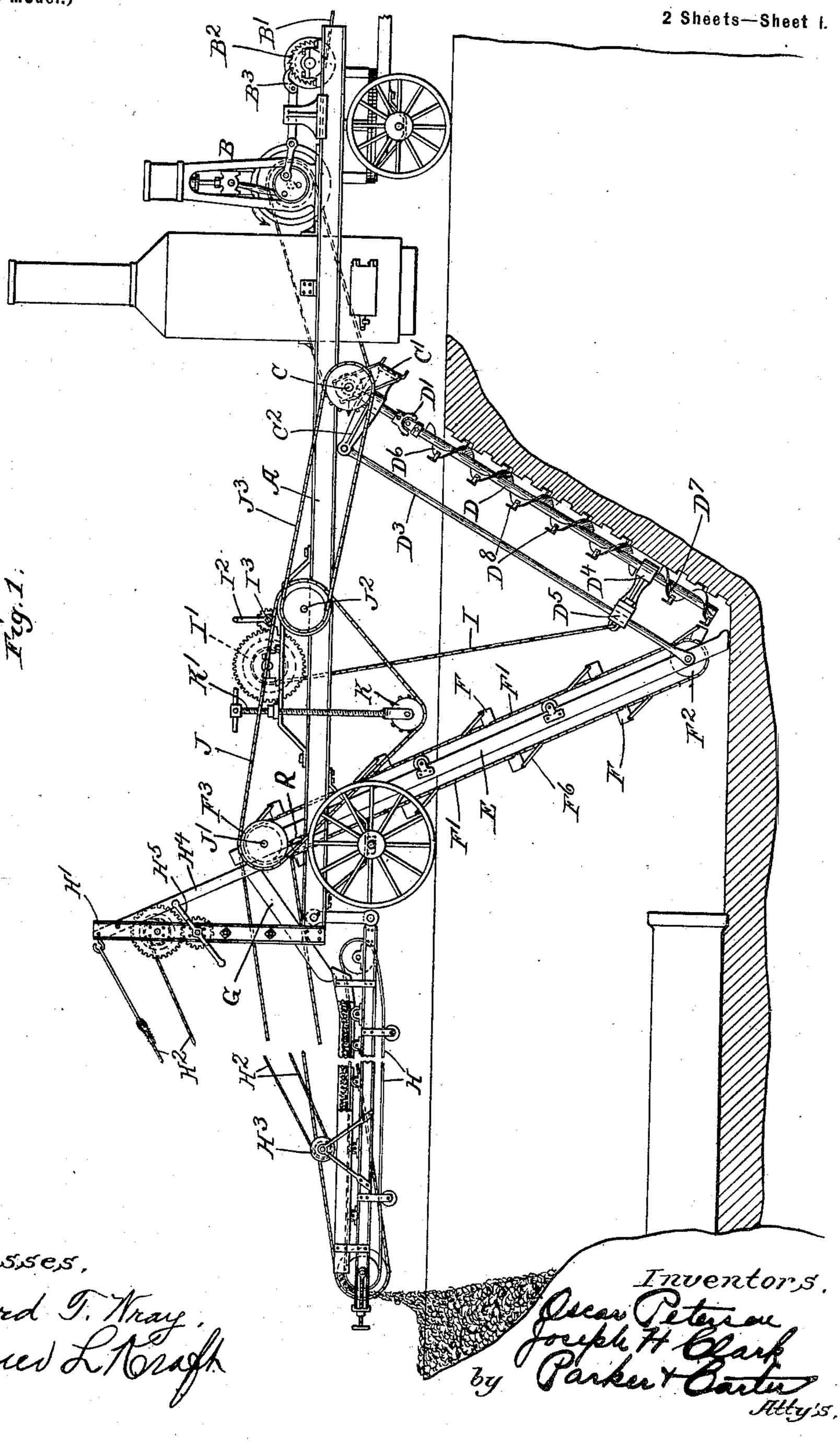

Fig. 1.

Witnesses.
Edward T. Wray.
Howard L. Kraft.

Inventors.
Oscar Peterson
Joseph H. Clark
by Parker & Burton
Atty's.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 708,395. Patented Sept. 2, 1902.

O. PETERSON & J. H. CLARK.

DEVICE FOR DIGGING DITCHES.

(Application filed Apr. 15, 1901.)

(No Model.) 2 Sheets—Sheet 2.

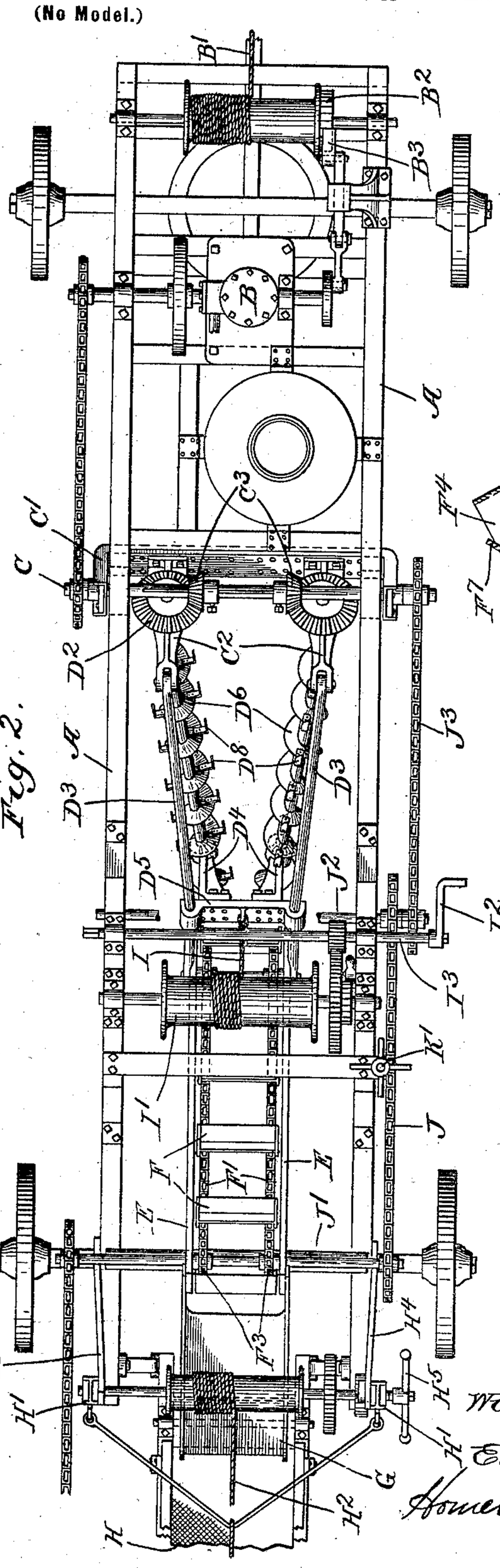

Fig. 2.

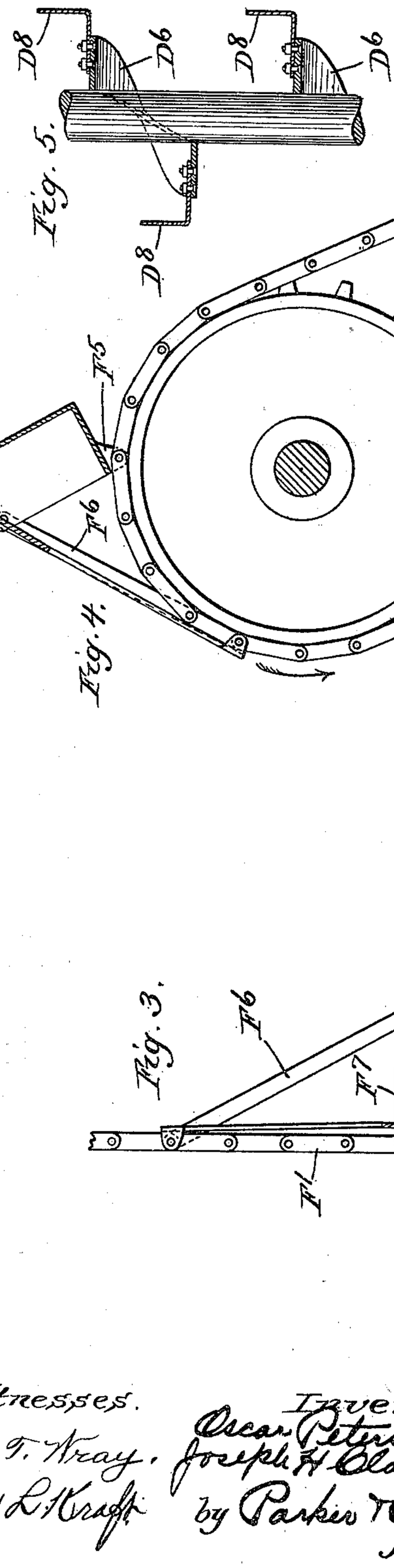

Fig. 5.

Fig. 4.

Fig. 3.

Witnesses.
E. F. Wray.
Homer L. Kraft.

Inventors.
Oscar Peterson
Joseph H. Clark
by Parker & Burton
Attys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

OSCAR PETERSON AND JOSEPH H. CLARK, OF CHICAGO, ILLINOIS.

DEVICE FOR DIGGING DITCHES.

SPECIFICATION forming part of Letters Patent No. 708,395, dated September 2, 1902.

Application filed April 15, 1901. Serial No. 55,852. (No model.)

To all whom it may concern:

Be it known that we, OSCAR PETERSON and JOSEPH H. CLARK, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Devices for Digging Ditches, of which the following is a specification.

Our invention relates to digging devices adapted for digging ditches or making excavations for any purpose, and has for its object to produce a new and improved construction of this description.

Our invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a side elevation, with parts omitted, of a device embodying our invention. Fig. 2 is a plan view of the device shown in Fig. 1. Fig. 3 is a view in part section, showing one of the elevator-buckets. Fig. 4 is a view showing one of the elevator-buckets when in its dumping position. Fig. 5 is a detail showing one of the cutting-blades.

Like letters refer to like parts throughout the several figures.

As illustrated in the drawings, the mechanism is carried by a movable frame or the like A, preferably mounted on wheels, so that it may be conveniently and easily moved. Upon this frame is preferably mounted a suitable motor B, which operates the mechanism. This motor may be of any description, and for the purposes of illustration we have shown it as consisting of a steam engine and boiler. This motor also preferably acts to draw the mechanism along to feed the cutting-blades. Any suitable arrangement for this purpose can be used. As herein shown, a rope or other power-transmitting device B′ is connected to a fixed point ahead of the machine and passes over a suitable drum on the frame. Associated with this drum is a ratchet-wheel B^2, which is engaged by a pawl B^3, connected with the motor. It will be seen that as the motor operates this ratchet-wheel is moved, and thus the machine is gradually drawn forward. A shaft C is mounted on the frame A and is operatively connected with the motor. A swinging or movable support C′ is connected with the frame of the machine or the shaft C, to which are attached the arms C^2, carrying the bearings for the screw or digging shafts D. This swinging support may be of any desired construction, and as herein shown consists of a channel-iron passing beneath the frame A and having its two ends bent at an angle to the main portion, as shown in Fig. 1, the shaft C passing through said ends, so that the support is free to swing. The shafts D are preferably divided, the parts being connected by a swivel or universal joint D′. The arms C^2 are connected to the swinging support in any desired manner. As shown in Fig. 2, for example, the swinging support is provided with a series of holes, and the arms are preferably removably and adjustably connected to the support by means of bolts or the like. By this arrangement it will be seen that these arms can be moved to and from each other, so as to vary the distance between the upper ends of the digging-shafts. Some suitable means is provided for operatively connecting the digging-shafts with the shaft C. Any suitable construction for this purpose may be used and as herein shown the digging-shafts are provided at their upper ends with beveled gears D^2, which engage beveled pinions C^3 on the shaft C. Connected with the arms C^2 are the rods D^3, which are pivotally connected to the side bars E of the elevator-frame. Said rods support the bearings D^4 for the lower ends of the screw or digging shafts. We prefer to have the lower ends of these shafts adjustable, thus permitting them to be operated when parallel to each other or when at an angle to each other and also giving a great range of adjustability, so as to vary the shape of the cut made by the machine. Any suitable means for this purpose may be used. As herein illustrated, the rods D^3 are connected at their bottom by the cross-bar D^5. The bearings D^4 are removably connected to this cross-bar by means of bolts or the like, and the cross-bar is provided with a series of holes, so that these bearings may be adjusted along its length in any manner desired.

The digging-shafts D are provided with screw-blades D^6, which do not act as cutters, but which take the dirt or other material when cut and convey it toward the elevator, by means of which it is lifted to the point desired. As herein illustrated, the screws D^6 convey the material downward, and the digging-

shafts are each provided with an additional screw D^7 of a reverse pitch, which tends to lift the material, the two screws acting in opposite directions to bring the material to the same point. These screws are provided with a series of cutting blades or knives D^8. These knives are preferably detachably attached to the screw-blades, as illustrated in Fig. 5. These blades, as illustrated, consist of two parts at an angle to each other, one of which acts as the cutting edge, the other being removably attached to the screw-blade by means of rivets, bolts, or the like. These cutting-blades may be placed at different angles and may be arranged differently and project differently at different parts of the screw. The cutting of the dirt or other material is done by these cutting-blades, and the screw simply conveys the loose material to a point between the ends of the shaft, the screw D^6 conveying the material downwardly and the screw D^7 conveying it upwardly. This loosened material is then deposited in the buckets F of the elevator F′, mounted between the side bars E. This elevator may be of any suitable construction, and as herein shown consists of the side bars E, between which are mounted link belts, the buckets being connected with these belts. The belts pass over the sprocket-wheels F^2 and F^3. The sprocket-wheels F^3 are connected with a shaft, which is operatively connected with the motor. These buckets, as illustrated in the drawings, are self-cleaning buckets. Great difficulty has often been experienced on account of the fact that the material sticks to the buckets and is not dumped at the proper point. By means of the improved bucket herein shown such difficulty is obviated, for the bucket will be automatically cleaned and the material forced out at the dumping-point. This bucket consists, as shown in Figs. 3 and 4, of the receptacle F^4, hinged to the belt in any desired manner, as by means of the lugs F^5. The outer ends of the buckets are held by means of pivot-braces F^6. Each bucket is provided with a movable back or cleaning part F^7, which projects from the bucket and has a pivotal connection outside of the bucket to some suitable part, which in the instance shown is the link belt. After the bucket passes around the lower sprocket-wheels F^2 it becomes filled with material and passes up along the side of the elevator, with the back or cleaning part in the position shown in Fig. 3. When the bucket reaches the dumping-point—that is, when it has passed around the upper sprocket-wheels F^3—the curve of the belts forces the back or cleaning part out, as shown in Fig. 4, and hence the material is forced out of the bucket and the bucket cleaned. The material as it passes out of the bucket falls into the chute or trough G and is then conveyed to any point desired. If, for example, the device is used to dig material, such as sand or clay, which is to be used at a distant point, it may be passed into wagons, cars, or the like. If the device is used in digging ditches for sewer-pipes, water-mains, and the like, it may be provided with a back-filling conveyer H, upon which the material is deposited. This back-filling conveyer is of such proportions as to permit the pipe to be laid between its discharge end and the digging-shafts, and the material dug is again deposited in the ditch or trench, so as to fill it up, the process being continuous, as illustrated in Fig. 1. This back-filling conveyer may be of any desired description and is preferably pivotally connected to the frame A and adjustably supported upon the standards H′ by means of a rope H^2, which passes over a pulley H^3, attached to the conveyer, and over a drum connected with the standards H′. This drum is provided with suitable operating mechanism controlled by the handle H^5, by means of which the conveyer may be raised and lowered, so as to vary its position. The upper end of the elevator is connected to the frame in any desired manner. As herein illustrated, said upper end is supported by the roller R or other suitable cross-piece, attached to the inclined parts H^4, which extend from the standards H′ to the frame proper of the machine. As the elevator is moved upwardly it is free to move along this roller or cross-piece, but is supported by it, so as to be held in proper position.

We have not claimed in the present application the bucket and conveyer illustrated and described, for the reason that such invention is the invention of the said Joseph H. Clark, who has filed an application covering the same.

When the self-cleaning bucket is constructed as shown in Fig. 4, for example, it will be seen that the movable back or cleaning part acts before the bucket reaches the chute G; but when the elevator is in operation we have found that the material is thrown a sufficient distance to insure its dropping into the trough G.

The digging-shafts and screws and elevator are controlled by means of a rope or the like I, connected to the cross-bar D^5 and passing over the drum I′. This drum is rotated by means of the crank I^2, connected on shaft I^3, which is operatively connected with the drum-shaft. It will thus be seen that a rotation of the drum in one direction lifts the digging-shaft and associated parts, thus adjusting their position and incline, as was before stated. The digging-shafts and screws are adjustable to and from each other, so as to vary the space between them and their annular relation.

The elevator F′ is operatively connected with the motor in any desired manner, as herein illustrated. A belt J connects the shaft J′, carrying the elevator sprocket-wheels, with an intermediate shaft J^2, which is operatively connected, by means of the belt J^3, with the shaft C. In view of the fact that the elevator and the digging-shafts are moved so as to rotate about the shaft C by the rota-

tion of the drum I′ it is necessary to provide some means of adjusting the belt J. As herein illustrated we have provided a belt-tightener consisting of the wheel K, attached to the threaded rod K′, which works in a nut associated with the frame A. It will be seen that this tightening device permits the belt J to be arranged so that it will drive in any of their various positions. When the device is moved from place to place, the elevator and digging-shafts are moved upwardly to their upper limit, so as to be free from the ground. In this position, and perhaps in other positions, it will be necessary to lengthen the belt J by inserting a piece therein. This can be done when the device is a link belt by separating the belt where any two links are connected together and inserting a separate piece of proper length in the opened space.

We have described in detail a particular construction embodying our invention; but it is of course evident that the form, construction, and arrangement of the parts may be greatly varied and that parts may be omitted and others used with parts not herein shown without departing from the spirit of our invention, and we therefore do not limit ourselves to the construction shown.

The use and operation of our invention are as follows: When the device is being moved from place to place, the digging-shafts and elevator will be lifted, so as to be free from the ground. When the machine is moved to the place where it is desired to operate it, the digging-shafts are lowered, so that contact is made with the material to be acted upon. The machine is then started up, and the weight of the parts forces the digging-shaft gradually into the material until a proper or desirable position—such, for example, as that in Fig. 1—is reached. The machine is then fed forward in any desired manner and by means of the ratchet-wheel and rope B′, attached to a fixed point ahead of the machine. If the device is used simply to excavate the material, which material is to be used at a distant point, such material would be carried up by the elevator and deposited in the manner desired. If the device is used for digging ditches, the back-filling conveyer may be used, the loose material being deposited thereon and being then placed into the ditch, so as to refill it, as shown in Fig. 1. The cutting-knives engage the material to be acted upon and do all the cutting, and these knives may be removed and replaced or readjusted as the circumstances warrant. It will also be seen that hard material or soft material or material filled with roots or like obstacles can be easily acted upon by means of the cutting-knife arrangement herein shown.

We claim—

1. A digging device comprising a movable frame, one or more digging-shafts connected therewith, said digging shaft or shafts each provided with a non-cutting screw for moving the material acted upon, and a series of cutting-blades connected to each of said screws.

2. A digging device comprising a movable frame, a motor mounted thereon, one or more digging-shafts adjustably connected with said frame and operatively connected with said motor, each shaft provided with a screw which acts to transport the material acted upon, said screw provided with a series of detachable cutting blades or knives which project beyond the edge of the screw.

3. A digging device comprising a movable frame, two digging-shafts adjustably suspended from said frame side by side, and means for adjusting said digging-shafts at their ends farthest from said frame so as to vary the angular relation between them.

4. A digging device comprising a movable frame, two digging-shafts adjustably connected therewith, means for rotating said shafts, a screw associated with each shaft, each screw provided with a series of detachable cutting-blades which project beyond the edge of the screw, and means for moving said screws so as to change their angular relation.

5. A digging device comprising a movable frame, two digging-shafts suspended therefrom, each provided with two screws of opposite pitch which engage the material to be acted upon so as to convey it toward a point between the ends of the shafts, said screws provided with detachable cutting-blades, an elevator associated with said digging-shafts and adapted to receive the material from the screws and convey it to a distant point.

6. A digging-shaft comprising a shaft proper, a screw-blade connected therewith, a series of knives detachably connected with said screw-blade and projecting beyond the edge thereof.

7. A ditch-digging device comprising a movable frame, a motor mounted thereon, two digging-shafts movably connected with said frame and adapted to be moved to and from each other so as to vary the angular relation between them, each shaft provided with a screw adapted to convey the loosened material to a given point, a series of detachable cutting-blades connected with said screw and projecting beyond the edge thereof, a conveyer adapted to receive the material from said screws and lift it to a given point, and a back-filling conveyer adapted to receive the material and deposit it in the ditch at a distance from the digging-shaft.

8. The combination with a digging-shaft of a screw-blade connected thereto, one or more knives consisting of two parts at an angle to each other, said knife or knives connected with the screw-blade so as to project beyond the edge thereof.

OSCAR PETERSON.
JOSEPH H. CLARK.

Witnesses:
DONALD M. CARTER,
FANNY B. FAY.