

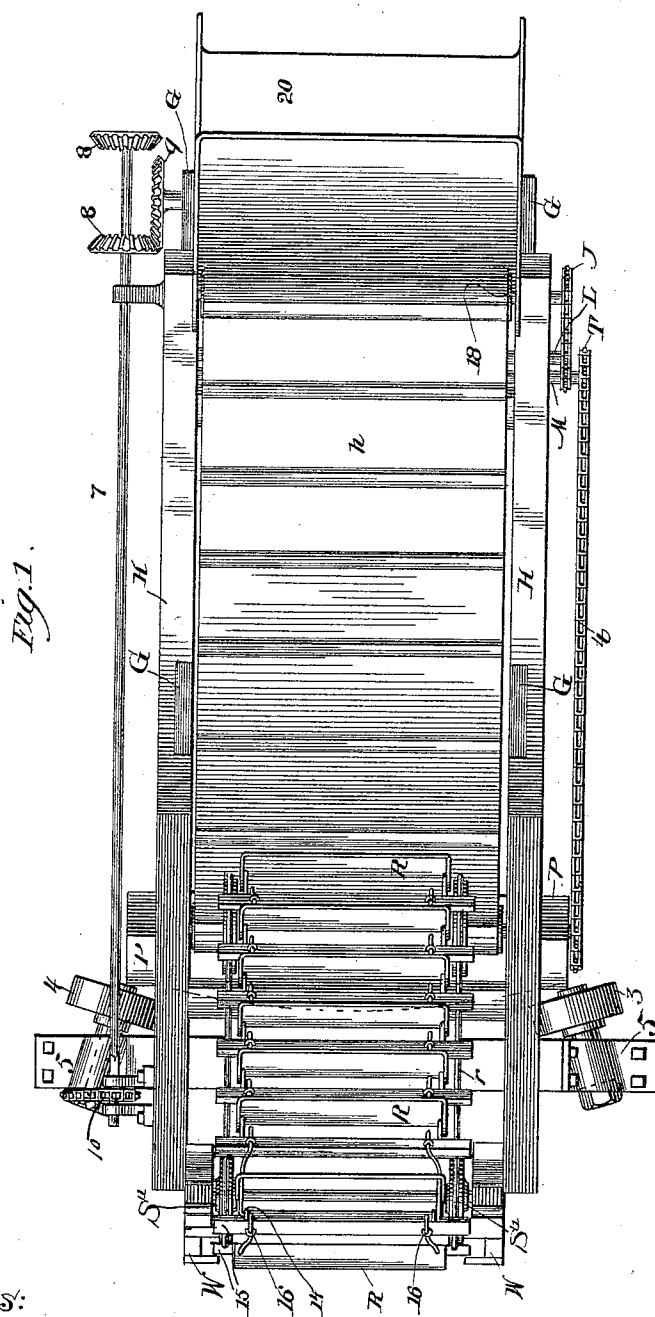
(No Model.)

4 Sheets—Sheet 1.

D. MURPHY.
EXCAVATING MACHINE.

No. 460,512.

Patented Sept. 29, 1891.



Witnesses:

Emma Stack

A. W. Munday

Inventor:

Samuel Murphy
by Munday Evans & Adcock
his attys

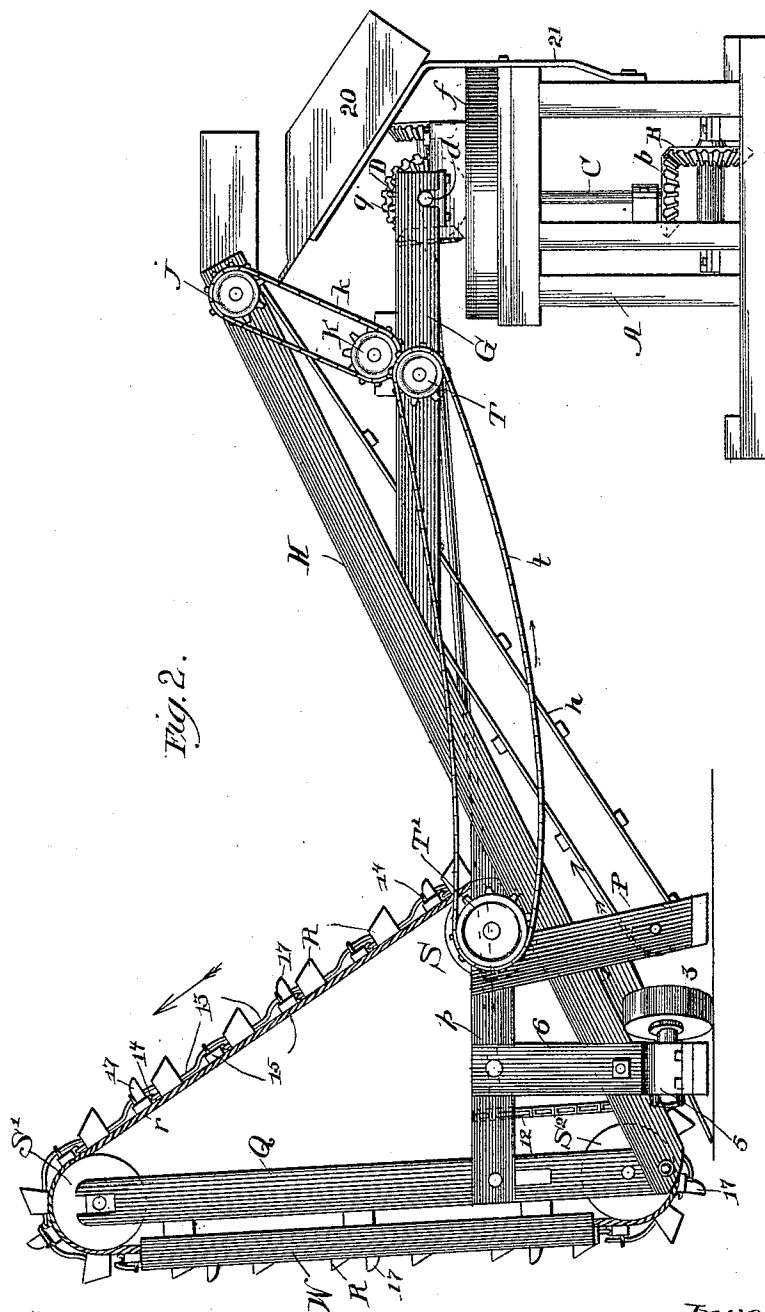
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H. W. Sunday.

Inventor:

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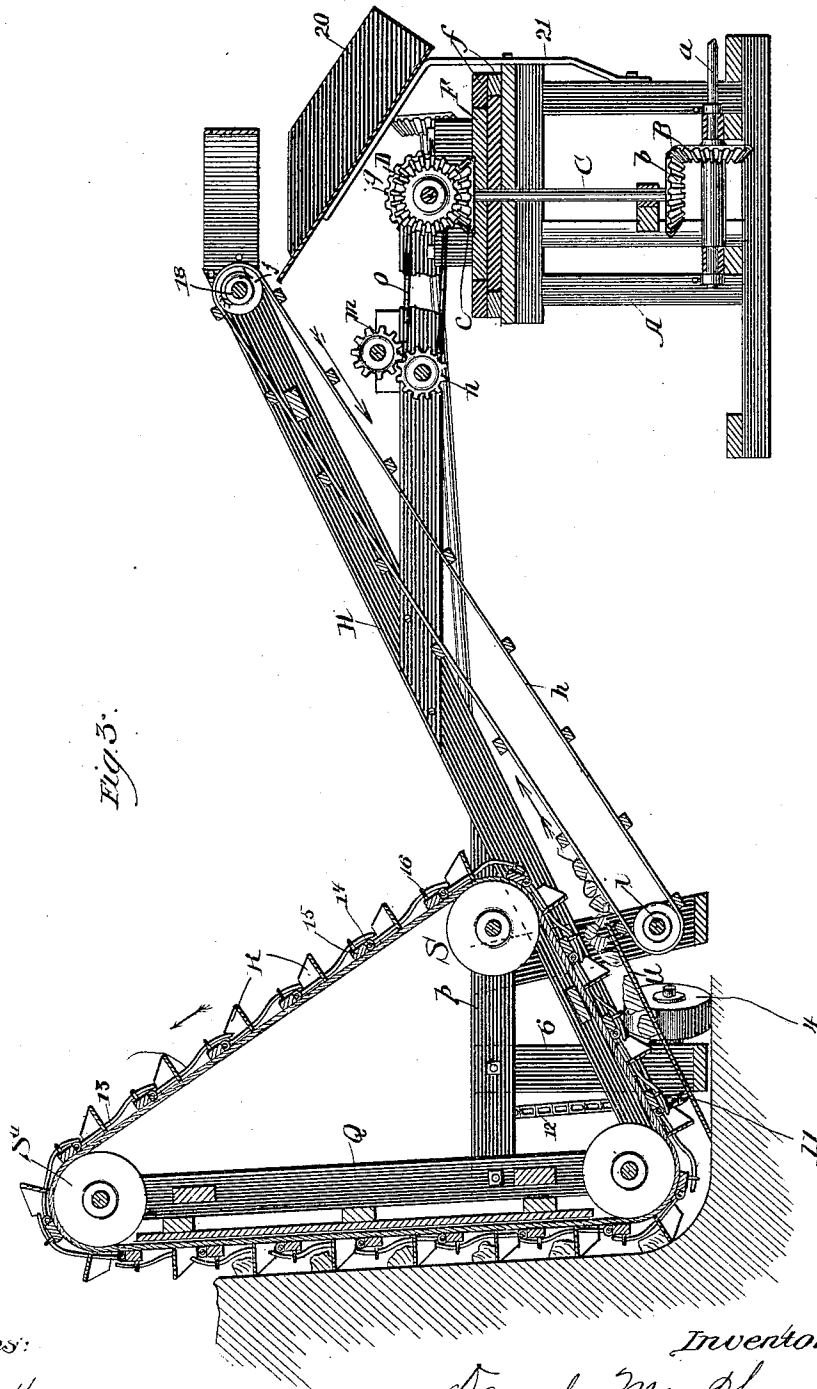
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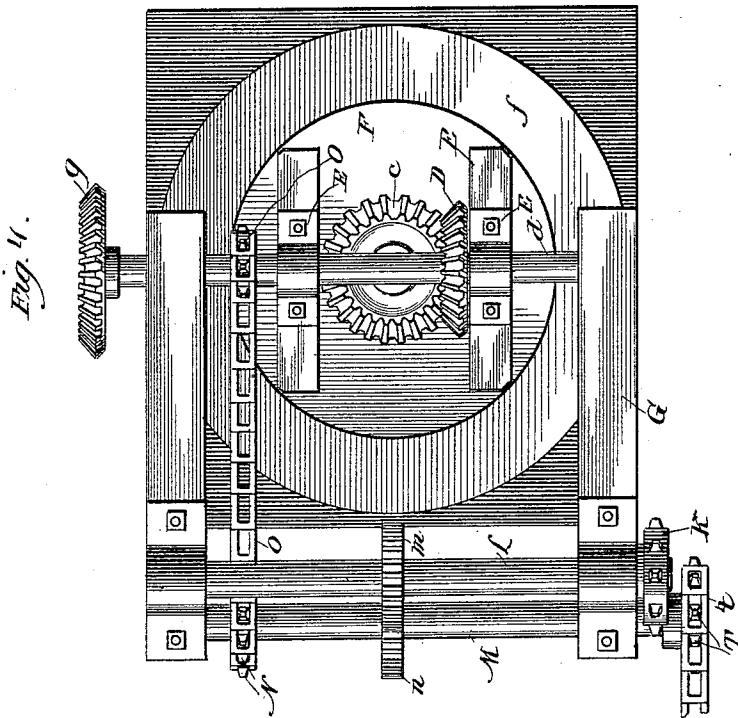
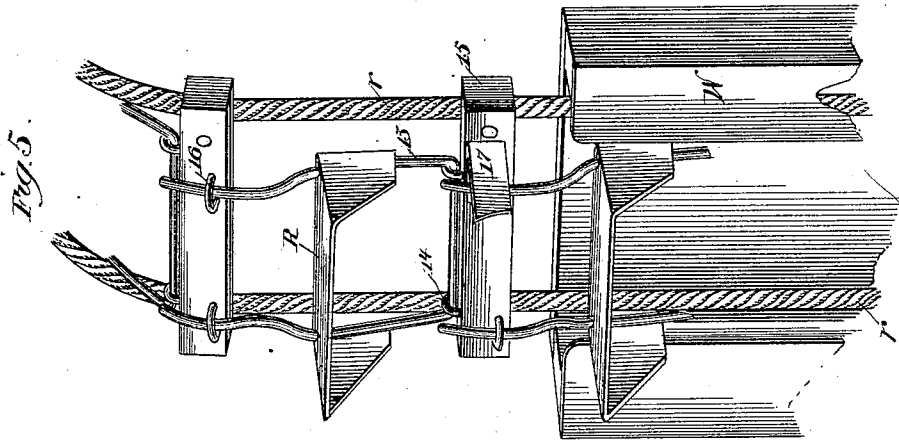
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Inventor:
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UNITED STATES PATENT OFFICE.

DANIEL MURPHY, OF SIOUX CITY, IOWA, ASSIGNOR TO HIMSELF AND
EDWIN CHILDREN, OF EAST DUBUQUE, ILLINOIS.

EXCAVATING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 460,512, dated September 29, 1891.

Application filed July 12, 1890. Serial No. 358,500. (No model.)

To all whom it may concern:

Be it known that I, DANIEL MURPHY, a citizen of the United States, residing at Sioux City, in the county of Woodbury and State of Iowa, have invented a new and useful Improvement in Excavating-Machines, of which the following is a specification.

This invention relates to machines for excavating banks of earth, and it embodies a series of scoops mounted upon endless chains and moving downward in a vertical plane, such series of scoops being adapted to be advanced against the breast of the earth which is to be excavated, and in combination with such scoops an elevator to which the earth loosened by the scoops is delivered, and by which it is carried to the rear of the machine and at a proper height for loading on a wagon or car. My intention in the devising of the invention has been to produce a more efficient machine than has heretofore been constructed, and the nature of the invention will be understood from the description which I here give.

The accompanying drawings, which form a part of this specification and in which similar letters and figures of reference indicate like parts, show at Figure 1 a plan, at Fig. 2 a side elevation, and at Fig. 3 a longitudinal vertical section, of my improved excavator. Fig. 4 is an enlarged plan of the turn-table, from which the various parts receive their actuating power. Fig. 5 is an enlarged perspective of a portion of the scoops.

In said drawings, A represents an upright frame, upon which is supported a shaft *a*, receiving power from a sweep or other motor. Said shaft *a* carries a spur-gear B, meshing with a similar horizontal gear *b* upon the vertical shaft C. This shaft C carries at its upper end a spur-gear *c*, which drives another gear D upon the transverse shaft *d*. The bearings E of shaft *d* are mounted upon a circular table F, which is confined on the frame A by rings *f*, with freedom to turn in said rings about a center coincident with the axis of shaft C.

G G represent side braces secured upon the counter-shaft *d* and extending forward to and supporting the side bars H of the elevator *h*. This elevator *h* consists of canvas, with cross-

slats running over drums *i* and *j*. Upon the shaft of drum *j* is a sprocket-wheel J, which receives power through the chain *k* from a sprocket K upon the shaft L, carrying a spur-gear *m*, meshing with a similar gear *n* on shaft M. This latter shaft is driven from the shaft *d* by the sprocket-wheels N and O and the chain *o*. The shafts L and M find their support in the braces G. The side bars H are continued down to the lower front corner of the machine and form a support for the frame of the excavating mechanism, and the lower drum *i* is preferably supported in a brace P, extending downwardly from the side bars H. A pair of horizontal bars *p* extend forward from the bars H and support the side bars Q of the excavating mechanism.

The excavating mechanism consists of a series of scoops R, mounted upon ropes or chains *r* and running over or around pulleys S S' S², located so as to give the scoops a triangular path, the front side of which is vertical, so as to enable the scoops to move downward along the breast of the bank and loosen the dirt as they travel, the dirt being free to fall when thus loosened to the lowest point in the path of the scoops. The scoop mechanism is actuated from shaft M by the sprocket-wheels T T' and chain *t*. The dirt loosened by the scoops in the downward movement along the breast of the bank is now forced along by the scoops in their movement through the lower portion of their path between sprockets S² and S and carried thereby onto the lower end of the elevator, a floor *u* being provided for this portion of the path of the scoops, which will enable them to carry along the loose material and elevate it sufficiently to enable its delivery upon the elevator. Some portions of the material will be carried down by the scoops, as illustrated in Fig. 3, and other portions may fall at the side. I prefer to inclose the downward path of the scoops, at least partially, and this may be done by means of boxes W.

The forward end of the machine is intended to be moved in a circular path along the front of the bank. In other words, it is swung through the segment of a circle having the turn-table as its center. To allow this move-

ment while the machine is in operation I support the front ends upon rollers 3 and 4, supported on feet 5, projecting outwardly from braces 6. One of these rollers is driven by means of a shifting shaft 7, carrying two spur-gears 8 8, meshing alternately with the spur-gear 9 upon shaft *d*, said shaft 7 having sprocket-wheel 10 splined thereto and driving a sprocket 11 upon the shaft of roller 4 by means of the chain 12. It will readily be seen that the direction of movement given to the forward end of the machine will depend upon which of the gears 8 8 is in mesh with the gear 9, and that the direction of such movement may be readily changed by shifting shaft 7 so as to change the engagement from one of said gears 8 to the other.

The scoops are of a peculiar construction. They consist of sheet-metal blanks bent to a U form, with the side members beveled off, as indicated at Fig. 5, and mounted and carried by wire frames 13. These frames 13 are hinged, as at 14, each to a cross-bar 15, carried by the ropes *r*, and the ends of the wire pass through eyes 16 upon the cross-bar coming next after the cross-bar to which the frame is hinged. This construction permits the scoops to pass freely around the pulleys, and the freedom of the joints between the frame and the cross-bars prevents any strain or bending of the frames. Some of the cross-bars 15 are armed with knives 17, located in line with the sides of the scoops and adapted to assist the scoops in cutting and loosening the earth. Said knives preferably extend so as to enter the earth a slightly greater distance than the scoops, and as the machine is in constant motion they travel through the earth in diagonal lines, thus loosening the entire surface of the bank of earth as the same comes within their range of movement.

The elevator at its upper end dumps the dirt into the chute 20, and this chute is supported from the frame A by braces 21 at a proper height to deliver the dirt onto wagons or railroad-cars.

The operation of my improved machine is as follows: The turn-table being positioned at the right distance from the bank with the machine lying parallel with the bank, or nearly so, power is communicated to the machine, and the operating or front end is swung upon the turn-table and enters the bank, moving in so doing in a circular path, and the speed of the movement after the work commences being dependent, perhaps, upon the amount of excavating done. The knives in their downward path loosen the dirt, so that the same falls upon the scoops and is carried to the foot of the excavating mechanism and is from that point forced by the scoops over the floor U and onto the elevator, which carries it upward and delivers it onto the chute 20, which is supported from the frame A by braces 21. This chute is adapted to deliver the dirt to wagons or, perhaps, to railway-cars. The front end of the machine is

carried by the rollers through its prescribed path, which is the segment of a circle, and until it has reached a position at the opposite side of the turn-table from that occupied by it at the start. The turn-table is now shifted along in line with the bank or toward it sufficiently to bring a fresh portion of the bank within the swing of the machine, and the machine is started back in the opposite direction from that previously traveled by it, the roller-operating shaft being shifted, as already described, so as to mesh with the other one of gears 8. In this reverse movement the machine operates precisely as before and continues until it has traveled through that portion of the bank lying within its circular path. When it has reached the end of this movement, the turn-table is again shifted and the machine swung around in the same direction as at first, and so on.

The boxes W serve to confine the dirt at the side of the scoops and to compel it to fall into the bottom of the path of the scoops, where it will be caught by them and carried to the elevator. If there were no guards of this kind at the sides, such of the material as fell at one side of the excavating mechanism would fail to be caught by the scoops and thus taken to the elevator. By employing the side guards I therefore compel the machine to pick up the great portion of the dirt which it removes from the bank, and I also obtain the aid of the gravity of the dirt in operating the scoops.

I claim—

1. An excavating-machine provided with a series of scoops moving downward and inclosing sides for preventing the escape of the dirt, substantially as set forth.

2. In an excavating-machine, a series of knives and scoops mounted upon endless chains or ropes and the forward portion of whose path is downward in a vertical plane, and side inclosures for said scoops and knives adapted to prevent the escape of the dirt, substantially as set forth.

3. In an excavating-machine, a series of knives and scoops carried by endless chains or ropes, one portion of whose path is directly downward, so as to enable the loosening of all the dirt, and another portion is nearly horizontal to enable the scoops to scrape the dirt thus loosened onto the elevator, in combination with an elevator one end whereof is located under said horizontal path, substantially as set forth.

4. In an excavating-machine, a series of earth loosening and scraping devices and their carrying endless chains or ropes moving in an endless path, one portion of said path being directly downward and another portion being nearly horizontal, in combination with an elevator the end whereof is located under said horizontal path and is thus adapted to receive the earth from the scraping devices, substantially as set forth.

5. In an excavating-machine, a series of

downwardly-moving earth loosening and scraping devices and their carrying chains or ropes, in combination with an elevator for carrying away the loosened earth, the path of the downwardly-moving loosening and scraping devices extending to the bottom of the cut, substantially as specified.

6. The combination of the excavating devices moving in an endless path and adapted to be moved along the bank of earth, one portion of said path being vertically downward to enable the excavating devices to loosen the earth from the upper as well as the lower portions of the bank, the elevator for carrying the dirt to the discharge-chute, and the floor over which the scoops carry the dirt to the elevator, substantially as set forth.

7. The excavating-machine consisting of a series of excavating devices for loosening the dirt and traveling in an endless path, an elevator for carrying the dirt so loosened to the discharge-chute, a turn-table serving as a center upon which the excavating end of the machine may swing, rollers placed under and supporting the excavating end, and reversible

mechanism for actuating said rollers, all combined and operating substantially as set forth.

8. The combination of excavating mechanism substantially such as described, an elevator, a turn-table to which the excavating mechanism and elevator are joined and upon which they swing while operating, and automatic mechanism for simultaneously operating the excavating mechanism and elevator and swinging them upon the turn-table, substantially as set forth.

9. The scoops R, the wire frames 13, hinged at 14 to one cross-bar and flexibly joined at 16 to the following cross-bar, and said cross-bars, in combination with the carrying cables or chains 7, all constructed and operating substantially as set forth.

10. The combination, with the excavating-scoops having a downward movement during their operation upon the bank, of side guards or boxes W, substantially as set forth.

DANIEL MURPHY.

Witnesses:

THOMAS MALONE,
JAY E. MORRIS.