J. T. DOUGINE.

Excavating-Machines.

No. 208,893. Patented Oct. 15, 1878.

Fig. 1.

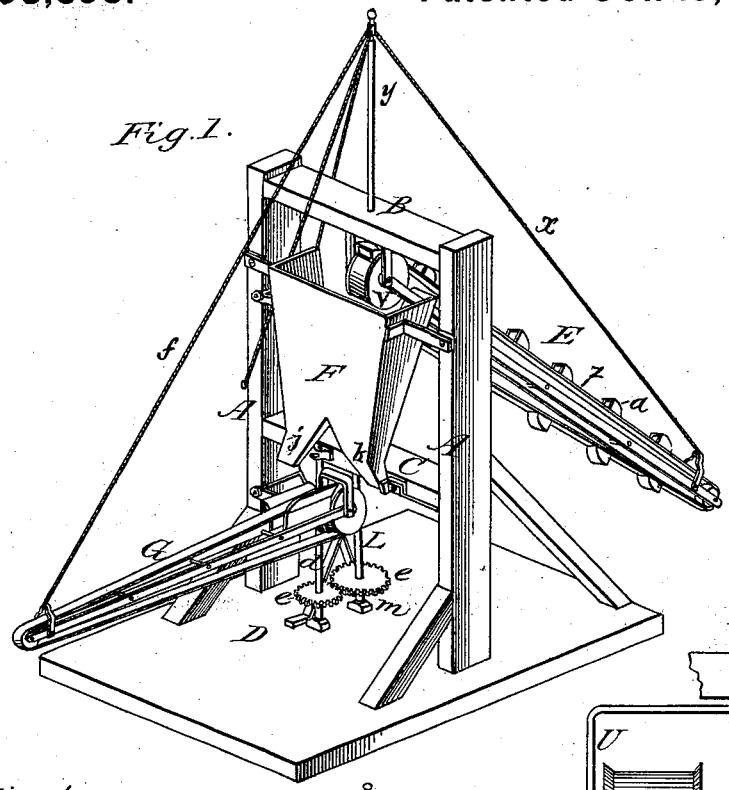


Fig. 3.

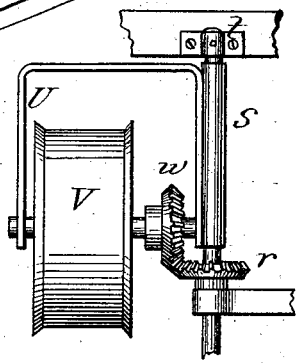
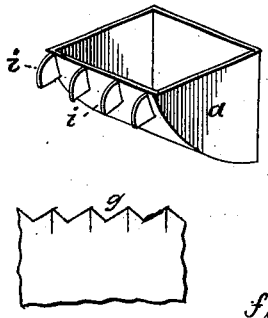


Fig. 4.



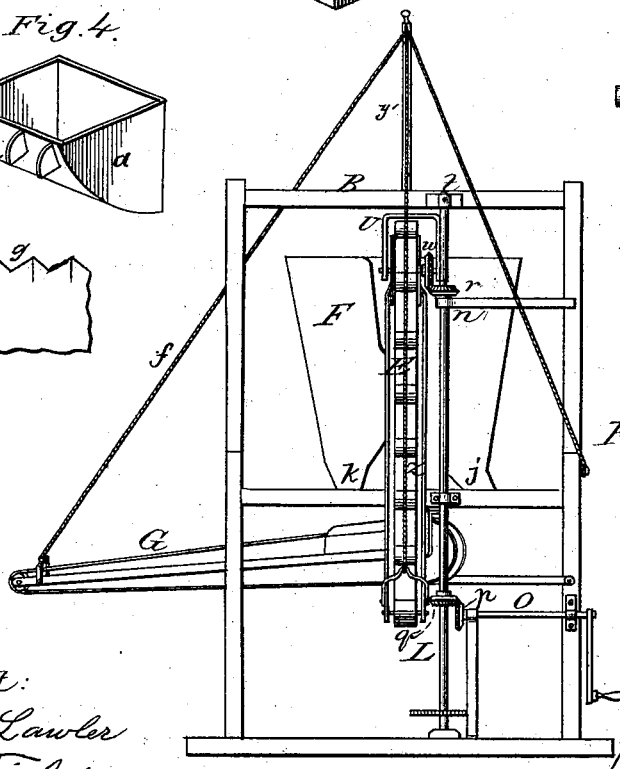


Fig. 2.

Attest:

D. B. Lawler

W. F. Black

Inventor.

James T. Dougine

per

Jno. L. Boone.

Attorney

UNITED STATES PATENT OFFICE.

JAMES T. DOUGINE, OF SAN FRANCISCO, CALIFORNIA.

IMPROVEMENT IN EXCAVATING-MACHINES.

Specification forming part of Letters Patent No. **208,893**, dated October 15, 1878; application filed June 4, 1878.

To all whom it may concern:

Be it known that I, JAMES T. DOUGINE, of the city and county of San Francisco, in the State of California, have invented an Improved Excavating and Embanking Machine; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to certain drawings forming a part of this specification.

My invention has reference to an improved excavating, ditching, embanking, and leveeing machine, which is extremely simple in the arrangement and operation of its parts, and which can be adapted for the excavating, carrying, and disposing of any substance or material that can be excavated by machinery, and either dumping it in a heap or distributing it over a large area or surface. It can also be used for handling coal, to load it into or discharge it out of ships, and for all that class of work that requires an elevator, a carrier, and a distributer, either with or without the digging mechanism. My machine is chiefly intended, however, for excavating and ditching purposes. I have therefore supplied it with digging facilities, by means of which I can excavate in all kinds of earth, and particularly in tough, rooty soil.

Referring to the accompanying drawings, Figure 1 is an isometrical perspective of the machine. Fig. 2 is an end view. Fig. 3 is an enlarged view of the elevator-pulley and its frame. Fig. 4 shows one of the buckets with slitting-knives.

Let A A represent two upright timbers, which are connected by a cross-beam, B, at the top, and another cross-beam, C, at a suitable height above the base D, the whole forming a strong frame-work, which can be mounted upon a scow for dredging purposes, or upon wheels for moving upon land, and which is strongly braced to resist the strains to which it must be subjected.

The essential elements of my excavating-machine are, first, a sweeping endless-chain excavator and elevator, E, which is attached at one end to the frame so that it will project out like a boom, and move about its fixed point or center, so as to sweep through the segment of a circle; secondly, a hopper, F, into which the endless-chain elevator dumps the elevated material; and, thirdly, a sweeping carrier, G, for receiving the material from the hopper, and carrying and dumping it upon the place of deposit. All of these parts have been used before in excavating machinery; but I have arranged them in such relation to each other, and have mounted the elevator and the carrier in such a manner, that the machinery is not only reduced to simple parts, but it is rendered capable of more economical and more beneficial uses, as will be seen farther on.

The hopper F is mounted upon the cross-beam C, and it has two or more discharge-spouts, *j k*, one being represented on each side in the present instance.

The driving-shaft L is a vertical shaft, and its lower end rests in a bearing or step, *m*, on the base D. This shaft extends up to near the top of the hopper, where it is supported in a bearing, *n*, by bracket-arms from one of the upright timbers A. This shaft is driven by a horizontal shaft, O, and bevel-gears *p q*, as represented. The upright shaft L terminates just above the bearing *n*, and it has a bevel-pinion, *r*, secured to its upper end above the bearing. The lower end of a short upright shaft, S, steps upon the upper end of the shaft L, and is supported at its upper end in a box or bearing, *t*, on the upper cross-beam, B, of the main frame. The endless-chain excavator and elevator E is suspended from a small frame, U, on one side of the short shaft, the pulley V of the elevator having gudgeons, which bear on one side in the frame U, and in the upright shaft S on the opposite side. A bevel-wheel, W, engages with the bevel-pinion *r*, so that at whatever position the frame U is turned to with reference to the shaft S the bevel wheel and pinion will remain in gear. The elevator-frame is suspended from the gudgeons of the pulley V, so that it projects outward like a boom. The lower end of this frame has a rope, X, attached to it, which passes up over a pulley in the upper end of a mast, Y, which is secured upon the upper cross-beam, B, of the main frame, and thence it passes downward to within reach of the engineer, so that by hauling upon the rope the outer end of the excavator-belt can be raised or adjusted as desired. Z is the endless belt or chain, upon which the excavating-buckets *a a* are secured in the usual way. This belt or chain passes over the pulley V at the upper

end of its frame, and another pulley at its outer end. The pulley V is mounted just over the mouth of the hopper, so that the buckets will discharge themselves into the hopper.

The carrier or distributing belt G is mounted in a manner similar to that described for the digging and elevating belt, only it is on the opposite side of the machine and below the lower cross-beam, C. It is mounted at the upper end of an upright shaft, *d*, which extends from the base D to the lower cross-beam, and it is driven by horizontal toothed wheels *e e*, one of which is secured upon the shaft L, and the other on the shaft *d*, so that the two mesh together, thus driving both belts from the same power-shaft.

The sweep of the carrier-belt is from side to side around an entire half-circle, and the throw of its center or point of suspension is such that it will receive the material from one of the discharge-spouts of the hopper when directed to either side. It is supported and handled by means of a rope, *f*, in the same manner that the excavating and elevating belt is handled, so that both booms or swinging belts can be managed and directed by ropes. Gearing could easily be applied, so as to render the movement of the belts automatic.

To facilitate the digging operation of the buckets when the machine is working in tough or rooty soil, I secure a steel cutting-edge, *g*, which is provided with teeth similar to saw-teeth, to the rim of each bucket. I also attach to the front of each bucket a series of slitting-knives, *i i*, which project in advance of the buckets at right angles to their front faces. The cutting-edge of each knife is beveled or curved outward and downward from the cutting-edges of the buckets, so that they pass through the soil with a drawing cut as the buckets move upward against the face of the bank. These knives slit the earth and cut the roots outside of the cutting-edge of each bucket, so as to leave the ground over which the bucket passes in proper shape for the saw-tooth edge of the following bucket to pass under and sever the slitted sod or strip of earth. These knives are therefore placed so as to alternate with the saw-shaped teeth. When the machine is used as a simple elevator these knives and the saw-toothed cutting-edge are not required.

This machine can also be used as a snow-plow, for excavating and removing snow from railway-tracks, in which case I mount it upon a car and propel it in advance of a locomotive.

From the foregoing description it will be seen that this machine will excavate, elevate, carry, and deposit material in any required manner. The excavating-boom can sweep around a quarter-circle, and even more, if desired, and cut and elevate the earth as it moves, while the carrier can be raised to any desired angle and moved about, so as to deposit the material in any desired manner on either side.

The hopper might be made to rotate, in which case its discharge-spout could be attached to the inner end of the carrier-boom.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The endless belt or chain excavator and elevator E, mounted as a swinging boom over the hopper F, and the carrier or distributer G, mounted also as a swinging boom underneath the hopper, and on opposite sides of the frame A B C, substantially as and for the purpose above described.

2. The endless belt or chain excavator and elevator E, mounted in the frame U on one side of its supporting-shaft S, said shaft having its step or bearing in the upper end of the upright driving-shaft L, so that both will be in the same line, in combination with the bevel-pinion *r* and bevel-gear wheel W, substantially as and for the purpose above described.

3. The hopper F, provided with two or more discharge-spouts, *j k*, in combination with a sweeping excavator or elevator, E, mounted above it, and a sweeping carrier or draper, G, mounted below it, so that the material is raised and dumped into it by the elevator, while the carrier G receives and conveys it away, substantially as described.

4. An endless belt or chain excavator, E, having one end mounted on gudgeons on one side of an upright shaft, S, while its opposite end is supported by a rope, X, which passes up over a mast, Y, and thence down to a windlass or other controlling mechanism, substantially as and for the purpose above described.

5. The excavator-buckets, each of which is provided with a cutting-edge, *g*, the rim of which is formed into saw-shaped teeth, in combination with the slitting or ripping knives or blades *i i*, which project outward and downward from the edge of the buckets, substantially as and for the purpose described.

In witness whereof I have hereunto set my hand and seal.

JAMES T. DOUGINE. [L. S.]

Witnesses:
W. F. CLARK,
D. B. LAWLER.