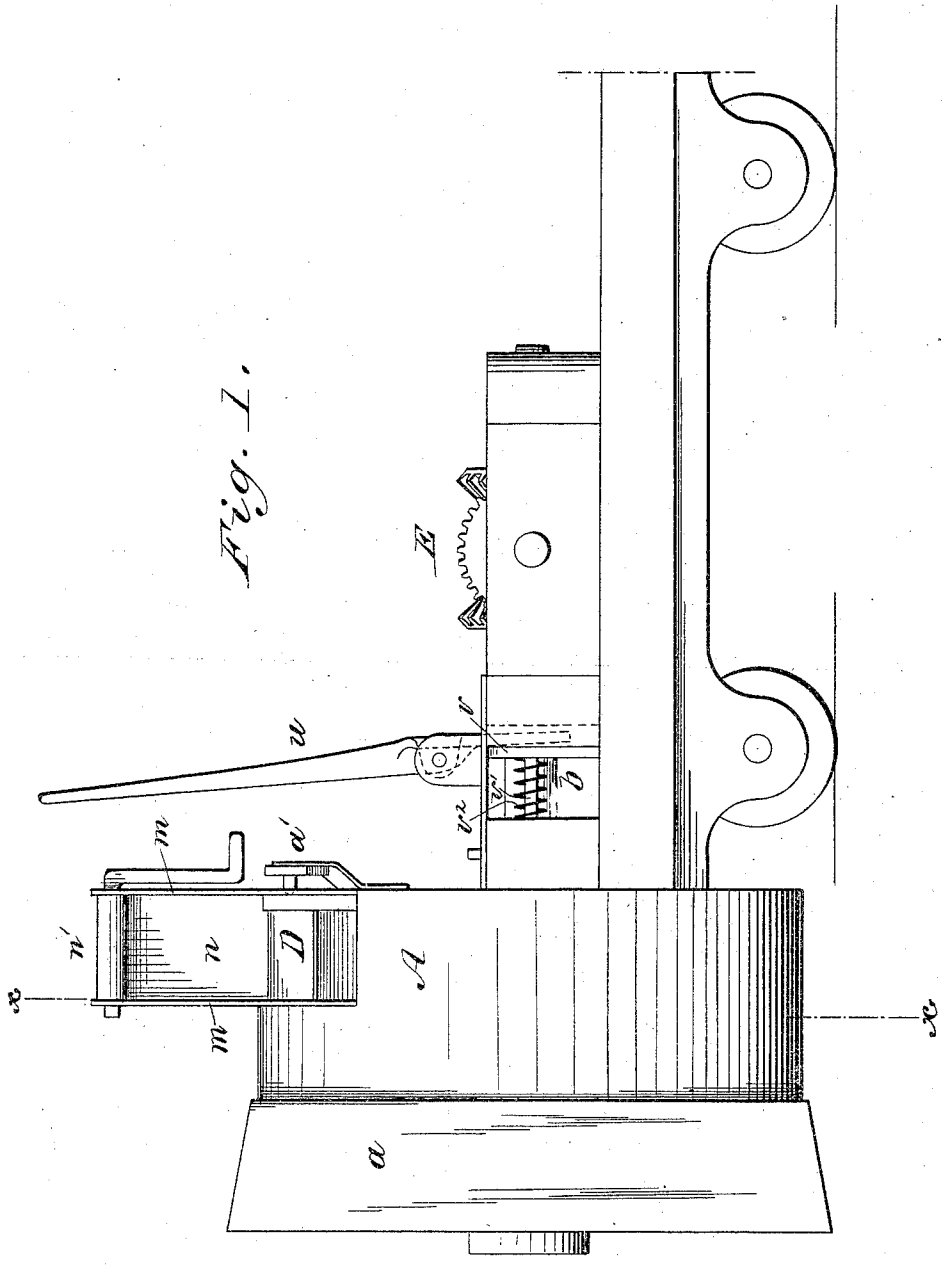
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# E. LESLIE.

## ROTARY EXCAVATOR FOR REMOVING SNOW, &c.

No. 317,809. Patented May 12, 1885.

Fig. 1.




WITNESSES:

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(No Model.) 4 Sheets—Sheet 2.

# E. LESLIE.

## ROTARY EXCAVATOR FOR REMOVING SNOW, &c.

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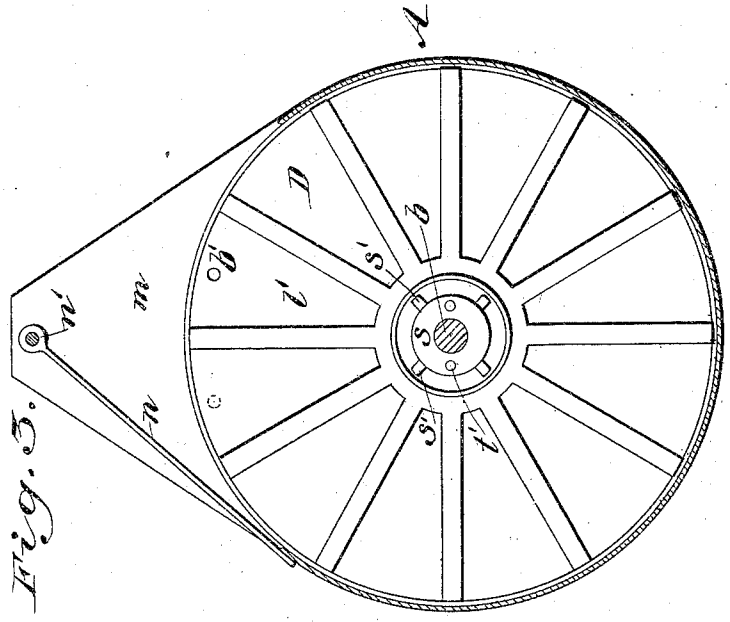



Fig. 1.

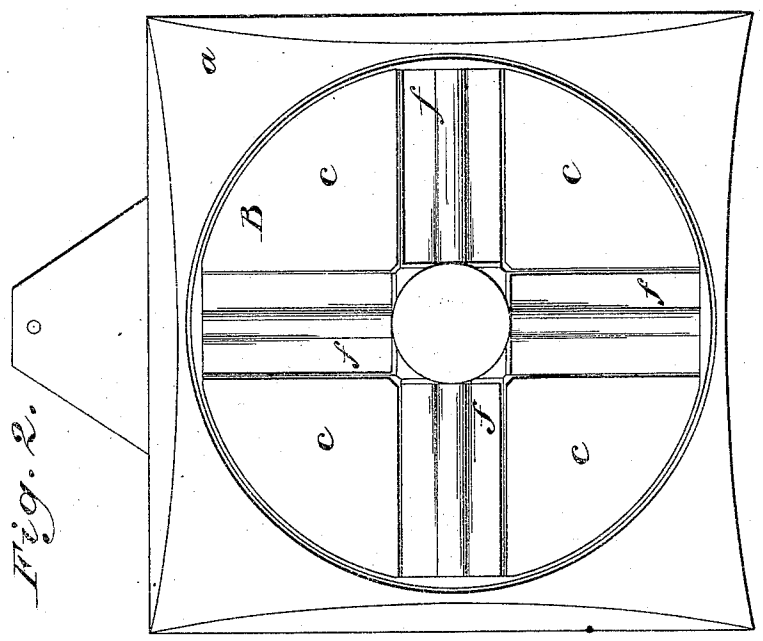



Fig. 2.

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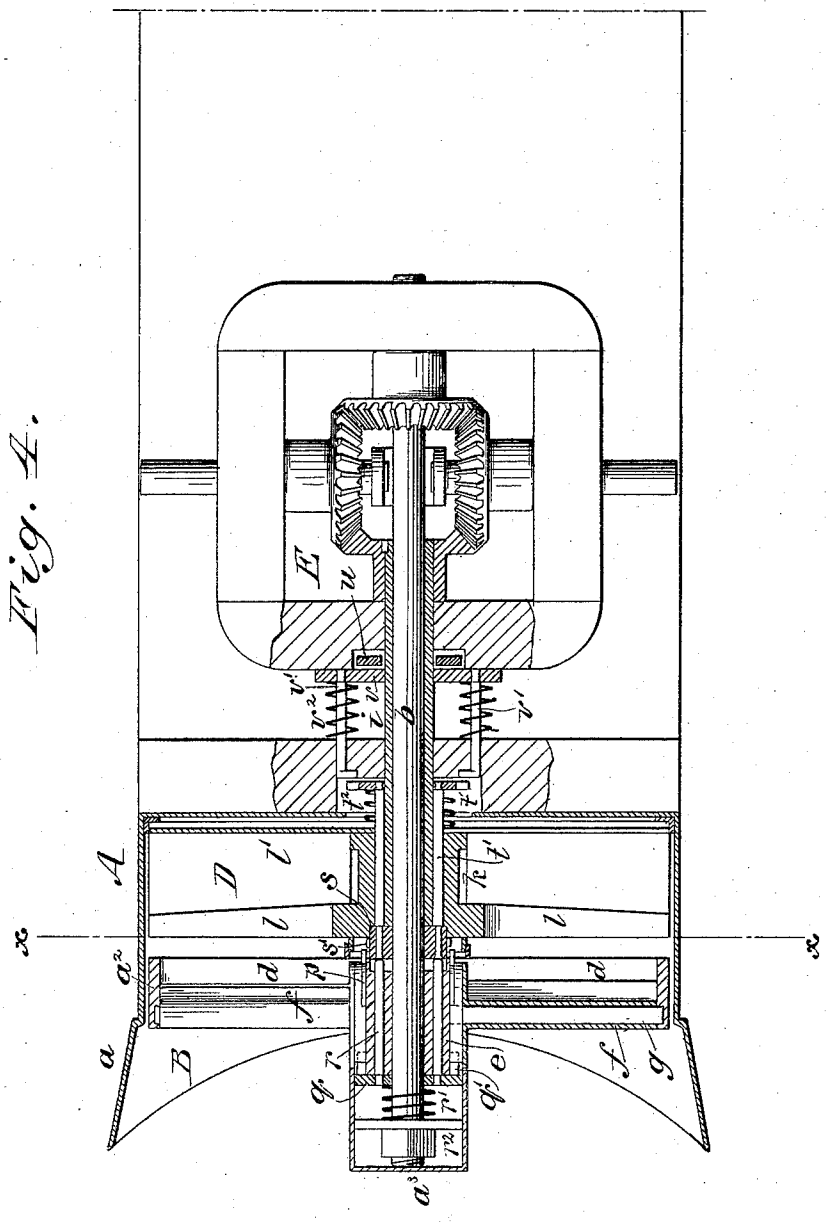
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# E. LESLIE.

## ROTARY EXCAVATOR FOR REMOVING SNOW, &c.

No. 317,809. Patented May 12, 1885.

Fig. 4.




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(No Model.) 4 Sheets—Sheet 4.

# E. LESLIE.

## ROTARY EXCAVATOR FOR REMOVING SNOW, &c.

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*Fig. 5.*

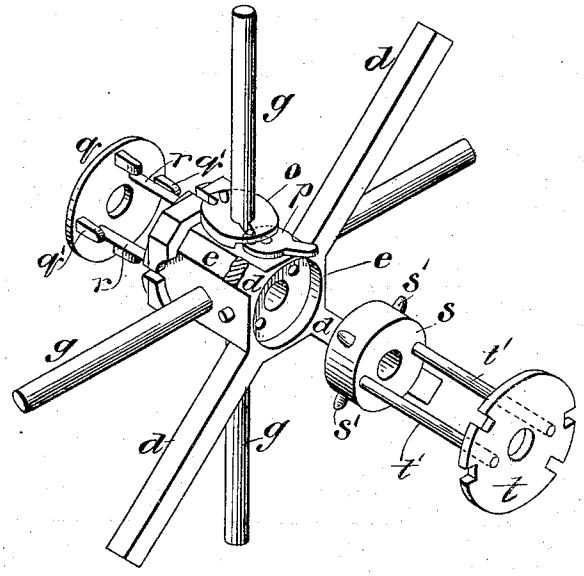
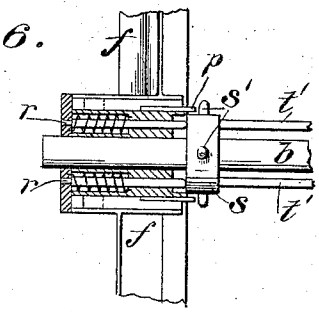



*Fig. 6.*




WITNESSES:

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# UNITED STATES PATENT OFFICE.

EDWARD LESLIE, OF ORANGEVILLE, ONTARIO, CANADA.

## ROTARY EXCAVATOR FOR REMOVING SNOW, &c.

SPECIFICATION forming part of Letters Patent No. 317,809, dated May 12, 1885.

Application filed October 8, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD LESLIE, of Orangeville, Dufferin county, Ontario, Canada, have invented certain new and useful Improvements in Rotary Excavators for Removing Snow and other Materials, of which the following is a full, clear, and exact description.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of a car provided with my snow-plow. Fig. 2 is a front view of the apparatus. Fig. 3 is a transverse section on the line *x x*, Figs. 1 and 4. Fig. 4 is a horizontal section in the plane of the shaft. Fig. 5 is a perspective view of the wheel-hub and adjusting mechanism of the cutters. Fig. 6 represents a modification.

My improvements relate to the class of machines for removing snow from railway-tracks and other places and for excavating or removing sand and earth which are constructed to cut through the banks of snow or earth. I make use of a revolving head, in the form of a wheel or disk, which is fitted with radial cutting-blades that are reversible, so as to allow of the operation of the head in either direction, and with this revolving head is combined a fan-wheel, which acts to discharge the snow at the side of the track.

The apparatus is mounted on a car, as represented in Fig. 1. Upon the forward end of the car is fixed a hollow cylindrical case, A, the front of which is formed as a square hood, *a*, having flaring edges that extend from the level of the track to a suitable height and at each side to considerable width, so as to form an opening through the snow large enough for the car to pass. Upon the car, in suitable bearings, is a horizontal shaft, *b*, that extends forward through the center of the case A, and carries upon its outer end a circular head or wheel, B, that is formed of four sections, *c c*, fixed upon arms *d*, that project from a hub, *e*, on the shaft.

Between the sections *c* of the head or wheel B are the blades or cutters *f*, which are in the form of flat plates, attached upon arms *g*, projecting from the hub *e*, and these blades are fitted to turn on the arms, so as to allow them to be set at an inclination in either direction. The arms *d g* and sections *c* are connected by a band or rim, $a^2$, which thus serves to connect and strengthen these parts and brace the wheel.

Upon the shaft *b* is a hollow shaft, *i*, on which is fixed the hub *k* of a fan or delivering wheel, D, which is contained within the case A behind the head B. This wheel consists of a series of radial fans attached to arms *l*, and closed at the back part by a plate, *l'*, which, by excluding snow from contact with the back of case A, prevents friction. In the top of the case A, as shown in Figs. 1 and 3, is an opening the width of the wheel D, and extending equal distances at each side of the center. Upon the case at the sides of the opening are flanges or side plates, *m*, which rise above case A, and form thereon an upright spout, into which the snow is delivered through the opening in the case before mentioned. From this spout the snow is discharged upon either side of the machine by operating the gate or cap *n*, which is hung and swings between the flanges *m* on a cross-shaft, *n'*, that is provided with a crank-handle or equivalent device, so that the cap may be turned to either side, thereby giving an opening for the discharge of the material at either side, according to the direction in which the wheel D rotates. A suitable spring-latch is provided for holding the cap *n* in place.

The shaft *b*, carrying the head B, and the shaft *i*, carrying the fan-wheel D, are connected together by the compound gearing at E, so that rotary motion being given to the shaft *b* to revolve the head in one direction the wheel D will be rotated in the contrary direction.

I provide for shifting the position of the cutters *f* by mechanism operated from the car as follows: The hub *e*, carrying the arms *g* and the cutters, is fixed upon the shaft *b*, and upon each arm *g* is a plate, *o*, that is engaged by a dog, *p*, pivoted on the hub in such a manner that when the dog is given a partial revolution the plate *o*, with the cutter, will be partially turned, and the cutters *f* thus shifted. Upon the outer end of the shaft *b* is a loose disk, *q*, having lugs or projections *q'*, which, when the disk is moved in contact with the face of the hub, project into notches formed in the plates *o*, so as to hold the cutters in either position. The disk *q* is carried

by pins $r$, that project through holes formed lengthwise in the hub $e$, and it is retained in contact with the face of the hub by means of a spring, $r'$, between it and a disk, $r^2$, fixed on the outer end of the shaft. Upon the shaft $b$, behind the hub $e$, is a loose disk or tumbler, $s$, of a size for entering a recess formed in the hub $e$, and this tumbler is provided with radial lugs $s'$, that project for contact with the dogs $p$. To the tumbler $s$, by means of pins or arms $t'$, is connected a disk, $t$, the position of which is at the back of the case A. The spring $t^2$, placed between the disk $t$ and the back of the case, serves to press the disk $t$ and tumbler $s$ backward, so as to retain the lugs $s'$ normally out of contact with the dogs $p$.

For moving the parts into operative position, I provide a lever, $u$, the forked lower end of which takes against a piece, $v$, fitted to slide upon the shaft $i$, and from the piece $v$ arms $v'$ extend into contact with the disk $t$. On the arms $v'$ are springs $v^2$, which press the piece $v$ backward into the normal position.

The parts operate as follows: When the piece $v$ is moved forward by means of the lever $u$, its arms $v'$, pressing against the disk $t$, cause the forward movement of the latter, consequently pressing the tumbler $s$ farther into the recess of the hub $e$, and the tumbler pressing against the ends of the pins $r$ the disk $q$ is caused to move forward from the face of the hub, so that its lugs $q'$ are disengaged from the plates $o$. In this position of the tumbler $s$ its several lugs $s'$ are between the dogs $p$, so that a turn of the shaft $b$ in either direction will bring the lugs $s'$ into contact with the dogs, and thereby turn the cutters in the direction required. The parts being then released by a backward movement of the piece $v$ and lever return to their first position, as described, and the cutters are held securely in place. The arms $v'$ have their inner ends bent or formed with hooks, and the disk $t$ has notches in its edges so placed that when the dogs and cutters have been properly turned the ends of the arms $v'$ come opposite the notches in the disk $t$, and the latter moves back to its first position, and by continued movement of the shaft the lever will also be returned to its first position when released as soon as the bent ends come opposite the notches in the disk $t$. These parts constitute automatic means for holding the lever forward until the cutters are shifted and for return of the parts to their first position. In place of using the lever for operating the parts, a steam cylinder and piston may be provided. I do not limit myself in that respect. There is a cap, $a^3$, fitted on the end of the shaft $b$ to exclude snow from the disks $q$ $r^2$, and for the same purpose the construction may be as shown in Fig. 6. In that case disk $r^2$ is omitted, and the springs placed in recesses in the hub around the pins $r$.

As the devices for reversing the cutters are not operative except when the tumbler $s$ is in proper relative position to hub $e$ and dogs, I provide the device shown in Fig. 1 for determining that point. It consists of a spring-arm, $a'$, attached on the back of case A, and provided with a pin or lug projecting through the case. By pressing arm $a'$ inward its pin is forced into contact with the plate $l'$ of the wheel D until by turning the wheel the pin enters a hole, $b'$, which occurs when the parts are in proper position for shifting the cutters.

The machine may be used for removing snow from railway-tracks, street-railways, streets, and sidewalks, and also for excavating or removing earth.

In place of using dogs for moving the cutters, gearing of any suitable form may be used.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In an excavator, a revolving head or wheel formed of segments or sections separated by openings and provided with independent cutting-blades covering the openings, substantially as shown and described.

2. In an excavator, a revolving head formed of segments or sections separated by openings and provided with cutting-blades covering the openings and adjustable to cause the cutters to act in either direction desired, substantially as described.

3. In an excavator, the combination of the adjustable cutting-blades with the head or wheel, substantially as shown and described.

4. The hub $e$, arms $g$, cutters $f$, notched plates $o$, and sliding disk $q$, provided with the lugs $q'$, combined for operation for the purpose specified.

5. The combination of the cutter-arms $g$, notched plates $o$, disk $q$, provided with lugs $q'$, dogs $p$, tumblers $s$, having the lugs $s'$, the disk $t$, and arms $t'$, substantially as described, for operation as set forth.

6. The combination of the piece $v$ and lever $u$ with the disk $t$, tumbler $s$, and disk $q$, substantially as and for the purpose specified.

7. In combination with case A, the vertical spout rising above the case and carrying between its sides a swinging cap or gate, substantially as shown and described.

8. In an excavating-machine, the combination of the following instrumentalities, namely: a revolving head provided with adjustable cutting-blades and a mechanism for changing and adjusting the position of the blades, substantially as shown and described.

9. The combination of the arms $v'$, having bent ends, the notched disk $t$, piece $v$, and lever, substantially as described, for retaining the parts in operative position and automatically releasing them after the cutters are shifted.

10. The combination, with the recessed hub $e$, of the tumbler $s$, entered in the recess, so as to exclude snow or other material, substantially as described.

EDWARD LESLIE.

Witnesses:
EDGAR TATE,
EDWARD M. CLARK.