

(No Model.)

4 Sheets—Sheet 1.

W. MCINTOSH.  
SNOW AND ICE FLANGER.

No. 434,195.

Patented Aug. 12, 1890.

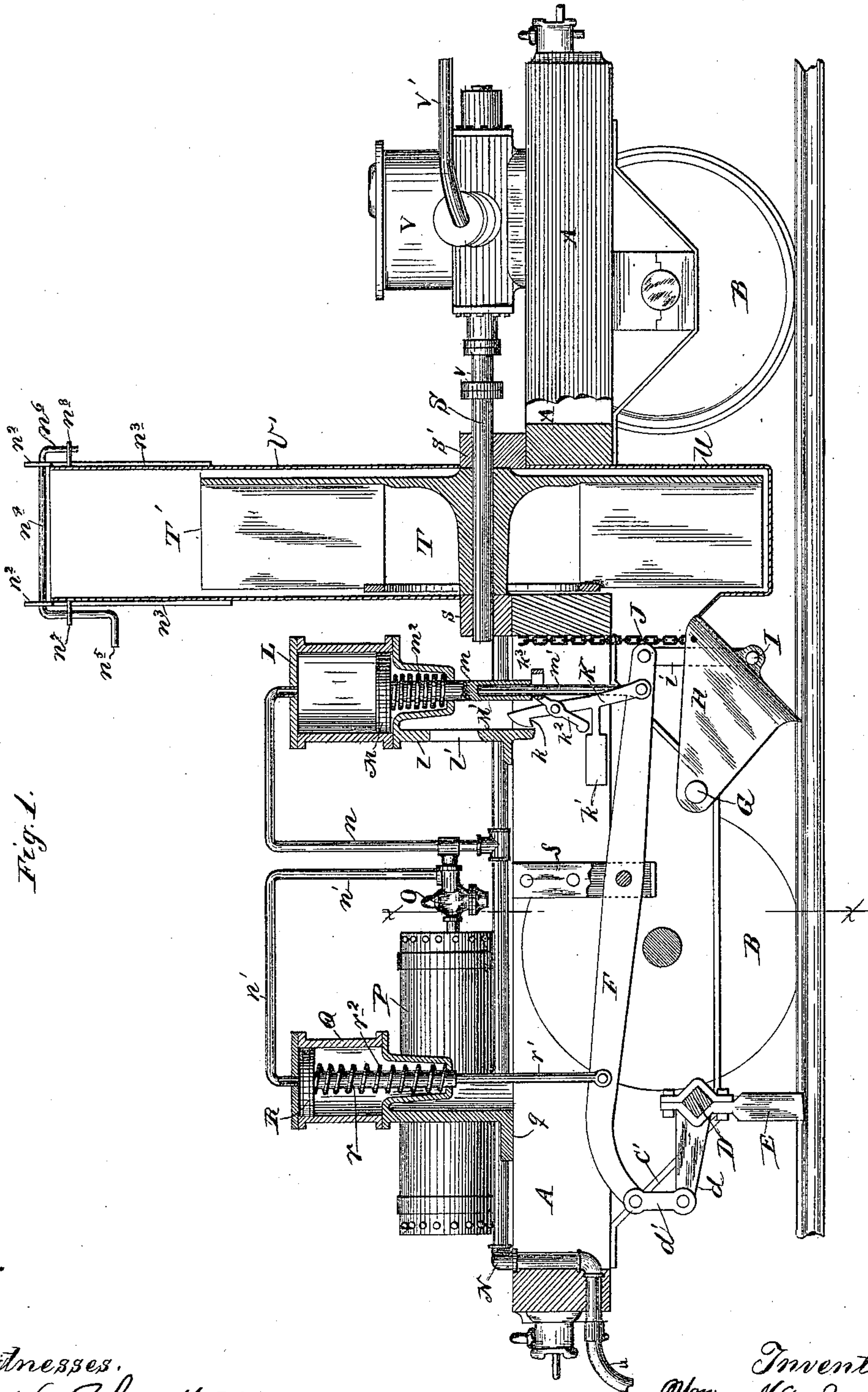


Fig. 1.

Witnesses.  
Wm. H. Blodgett,  
Frank D. Merchant.

Inventor.  
Wm. Mcintosh,  
By his Attorneys,  
Williamson & Blodgett.

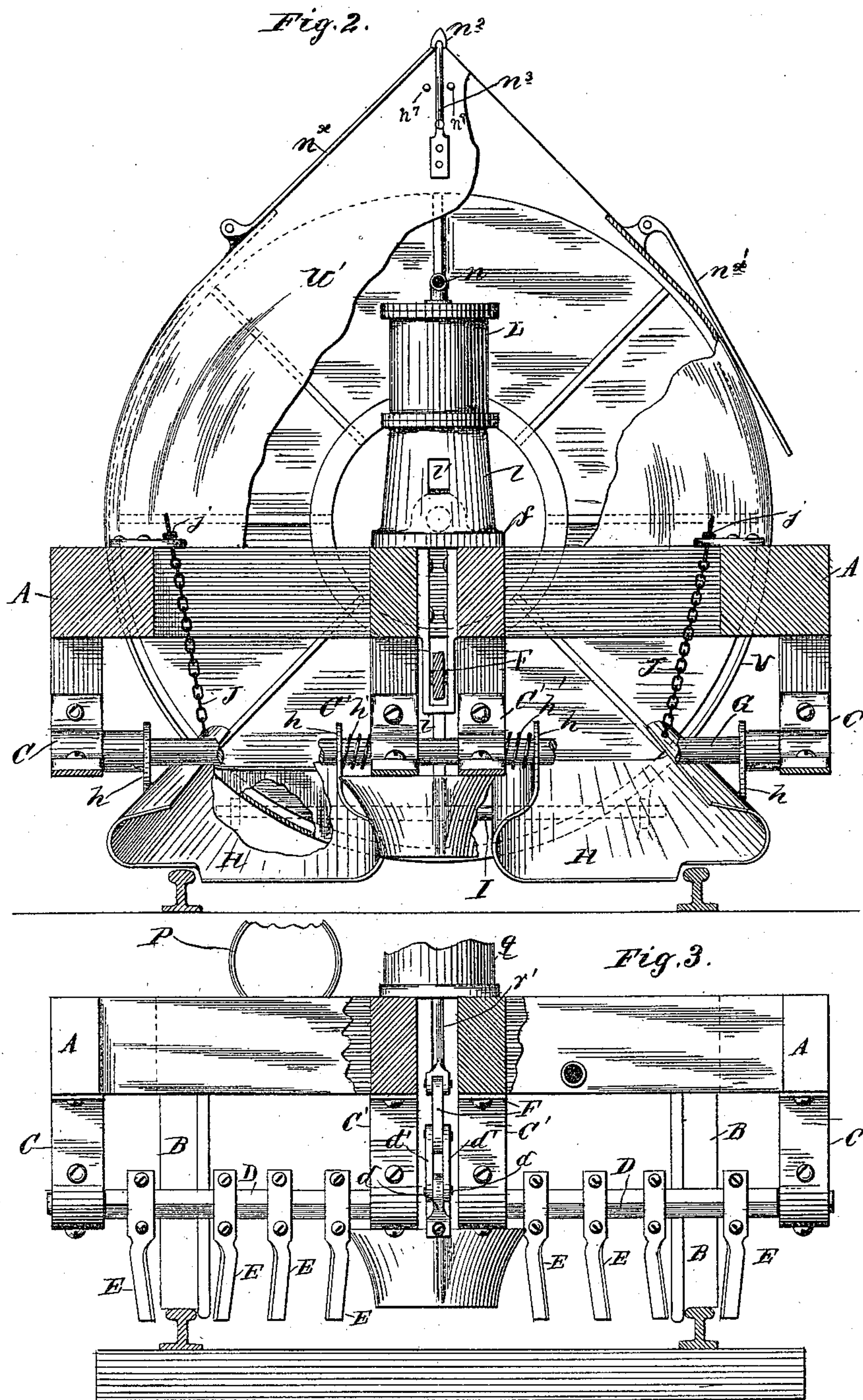
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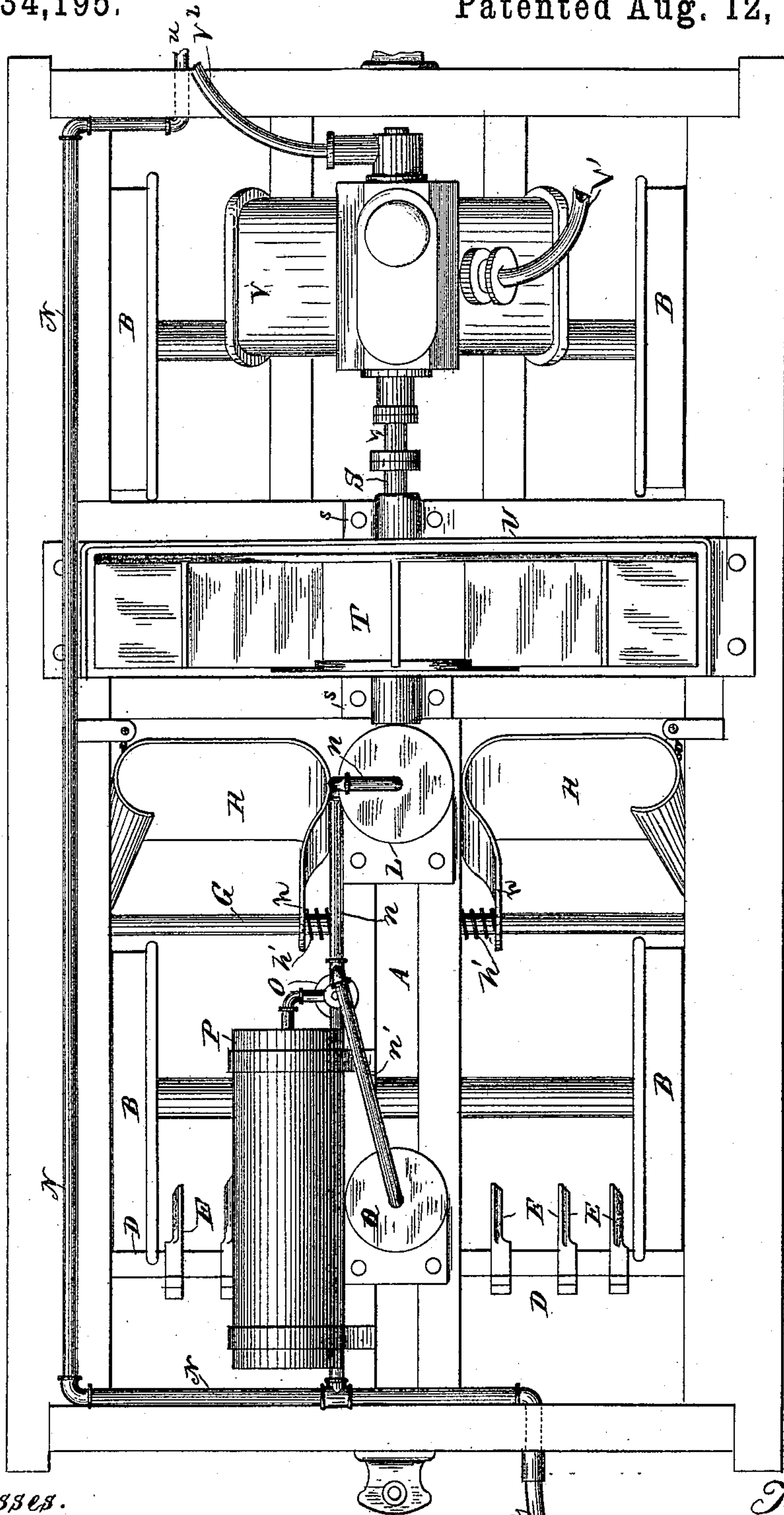
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Fig. 4.



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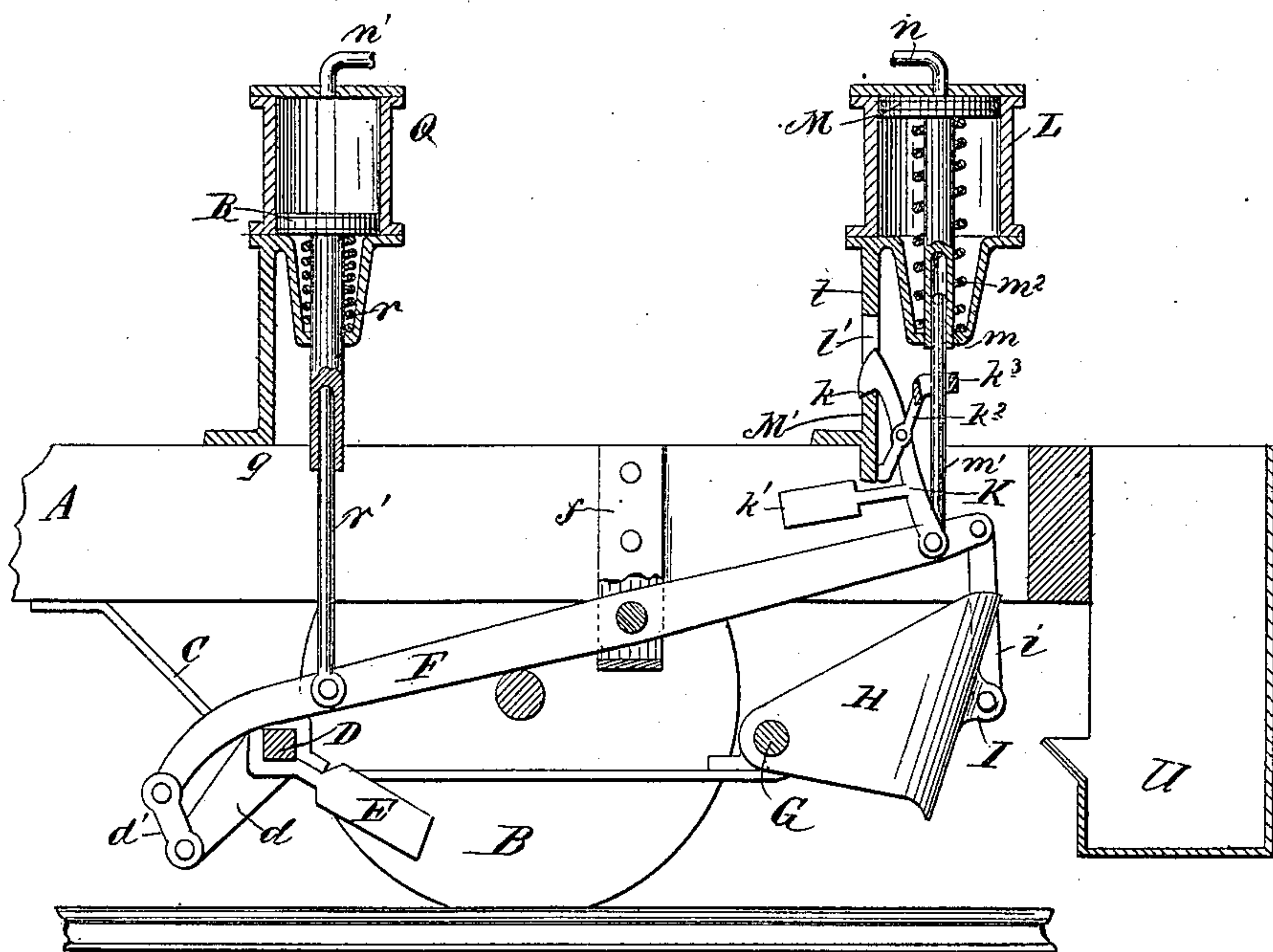
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Fig. 5.



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# UNITED STATES PATENT OFFICE.

WILLIAM MCINTOSH, OF WINONA, MINNESOTA.

## SNOW AND ICE FLANGER.

SPECIFICATION forming part of Letters Patent No. 434,195, dated August 12, 1890.

Application filed February 15, 1890. Serial No. 340,517. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM MCINTOSH, a citizen of the United States, residing at Winona, in the county of Winona and State of Minnesota, have invented certain new and useful Improvements in Snow and Ice Flangers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an apparatus for cleaning railroad-tracks from accumulations of snow and ice, and is what is commonly known as a "snow and ice flanger."

Heretofore various machines have been devised for this purpose, and they have generally been equipped with scrapers or plows arranged to be raised to pass obstructions, which force the snow from the track and deliver it in banks alongside thereof. All of these machines that have come under my observation are necessarily driven at a high rate of speed, and they are of but little service when snow becomes banked along the track and affords lodgment for drifts, as it speedily does when such machines are employed, and are entirely useless in deep cuts where there is the greatest necessity for thorough removal of the snow.

My invention is designed to overcome the objections to the machines before in use, and it comprises a truck on which are mounted appliances for cutting and breaking up ice or encrusted snow, and for delivering the snow at a distance from either side of the track which may be desired. Journaled in hangers depending from the forward part of the truck is a rock-shaft square in cross-section; except where it is mounted in the bearings, and upon the squared portions of this rock-shaft are mounted a series of blades for cutting the encrusted snow or ice. Pivoted between beams of the truck is a lever of the first order, which is connected at its forward end with an arm projecting from the rock-shaft by a link. Also mounted on a shaft rigidly supported in the hangers are scoops or scrapers provided with perforated arms loosely surrounding the shaft, said scoops being capable of a limited endwise motion on

the shaft against the action of suitable springs, and being connected so as to move in unison by a bar having a vertical arm attached to the rear end of the lever. Normally the lever and the cutters and scoops connected thereto are held out of their operative position by a pivoted latch or hook engaging with the wall of a slot in a vertical standard or othersuitable catch. To the upper end of this hook is pivoted an angular slotted lever, through one end of which the rod of the piston of an air-cylinder mounted on the standard loosely passes, said rod being connected at its lower extremity with the rear end of the lever for actuating the cutters and scoops. The piston-rod of this cylinder is divided, and attached to the upper section is a sleeve or tube which, when air is admitted into the cylinder, to force the piston downward, will come into contact with the angular lever pivoted to the hook or latch and will release the same from its keeper before the lever for operating the ice-cutters and scoops is actuated to throw them into operative position. An air-pipe with branches is suitably supported on the timbers of the truck, and this pipe is adapted to be coupled at either end with a tube leading to the storage-cylinder of the air-brake appliances of a locomotive.

Mounted on the truck are an auxiliary air-reservoir and triple valve of the Westinghouse pattern, and connected by a pipe with the triple-valve case is an air-cylinder in which is arranged a piston having a divided rod, the lower section of which is pivoted to the forward end of the lever for actuating the cutters and scoops. In virtue of this arrangement it will be seen that the cutters and scoops are under the direct control of the engineer, and that when the valve is turned to admit air into the cylinder located over the rear end of the pivoted lever the piston of said cylinder will be forced downward, the latch will be released, and the lever turned on its pivot to throw the ice-cutters and scoops into operative position. The air also passes through the triple valve and into the auxiliary storage-cylinder until the pressures in said cylinder and the pipe and valve-chamber counterbalance each other; and the parts



are now in a condition to raise the cutters and scoops to pass an obstruction, such as a switch or crossing. This is accomplished by the engineer, who moves the air-valve to release the air from the air-pipe and cylinder for throwing the cutters and scoops into operative position, when air will pass from the auxiliary reservoir through the triple valve and branch pipe into the top of the other cylinder, causing its piston to force downward the forward end of the pivoted lever, and through its connections lifting the cutters and scoops until the hook or catch engages with the wall of the slot in the standard and locks them in their raised position. The parts will be retained in this position until the engineer again admits air to the air-pipe and lowering-cylinder. Mounted in bearings supported on cross-timbers of the truck is a fan, the axle of which is coupled to the shaft of a reversible steam-engine of the rotary type, the frame of which is attached to the truck. The cylinder or case of this engine is adapted to be connected by a flexible pipe with a steam-valve under control of the locomotive-engineer. The portion of the fan extending below the timbers of the truck is surrounded by a case or chamber into which the scoops deliver the snow, while its upper portion is inclosed by a hood having an opening on each side closed by a door or lid. As the fan can be driven in either direction by the reversible steam-engine, the snow can be delivered on the side of but away from the track desired. Suitable springs surrounding the piston-rods of the air-cylinders force the rods and their connections to their normal positions after the air-pressure is removed.

In the accompanying drawings, in which like symbols of reference are placed on like parts throughout the several views, Figure 1 is a longitudinal vertical section of the machine. Fig. 2 is a cross-section on the line  $x$  of Fig. 1. Fig. 3 is an end view, partially in section. Fig. 4 is a plan view, and Fig. 5 is a partial longitudinal section showing the parts in their raised positions.

A is a truck mounted upon wheels B B in the usual manner.

C C' C' are hangers depending from the timbers of the truck at the forward end.

D is a rock-shaft, square in cross-section, except where journaled in the bearings of the hangers.

E E are blades or cutters for tearing or loosening ice or encrusted snow, detachably connected to the squared portion of the shaft.

$d$  is an arm rigidly attached to shaft D between the hangers C' C', and  $d'$   $d'$  are links connecting the end of said arm with a lever F, pivoted in a hanger  $f$ , suitably secured between two parallel timbers of the truck. G is a shaft rigidly mounted in bearings of the hangers C C'.

H H' are scoops or scrapers having perforated arms  $h$   $h$ , loosely surrounding the shaft G and adapted to turn thereon.

$h'$   $h'$  are coiled springs surrounding shaft G and placed between the hangers C' and the inner arms  $h$ . These springs permit the scoops or scrapers to yield or move longitudinally of the shaft in case they encounter an obstruction.

I is a rod connecting scoops H H, provided with a vertical link or standard  $i$ , attached at its upper extremity to the inner end of pivoted lever F.

J J are chains connected to adjustable bolts  $j$   $j$  for limiting the downward movement of the scoops.

K is a latch having a hook-shaped end  $k$  and a weighted extension  $k'$ , which tends to throw the latch inward, pivoted to the inner end of lever F.

$k^2$  is a tripping-lever, having a slotted end  $k^3$ , pivoted to latch K.

L is an air-cylinder carried by standard  $l$ , provided with slot  $l'$ , and M is a piston within said cylinder.

M' is the piston-rod of cylinder M, made in two sections  $m$   $m'$ , and  $m^2$  is a spring placed between the piston-head and a tubular projection from the standard on which the cylinder is mounted. Section  $m'$  of the piston-rod is connected with the inner end of lever F.

N is an air-pipe having branches  $n$   $n'$ , and provided with a flexible pipe  $n$  at each end, adapted to be coupled with the pipe leading from the compressed-air-storage tank of the tender of a locomotive. Branch  $n$  of said pipe is connected with the top of cylinder L.

O is an ordinary triple valve of the Westinghouse pattern, and P is an auxiliary air-reservoir in communication with said valve.

Q is an air-cylinder mounted on standard  $q$ , connected by branch pipe  $n'$  with the valve and with branch pipe  $n$  and main air-pipe N.

R is a piston within cylinder Q, and  $r$   $r'$  are the sections of the rod thereof, section  $r'$  being connected to the forward end of lever F.

$r^2$  is a coiled spring surrounding section  $r$  between the piston-head and a tubular projection of standard  $q$ , on which the cylinder is mounted.

S is a shaft mounted in bearings  $s$   $s'$ , suitably attached to the truck-timbers, and T is a fan having wings or vanes T', attached to said shaft.

U is a stationary fan-case or chamber surrounding the lower portion of the fan, said fan-case being open at its forward end to receive the snow from the scoops or scrapers H.

U' is a detachable hood or cover for the upper portion of the fan. The walls of this hood incline upwardly and converge at the top, and are provided with an opening in each side closed by a door or lid  $n^x$   $n^x'$ , and  $n^2$   $n^2$  are arrow-headed latches supported on spring-arms  $n^3$  for locking either lid in position.

$n^4$  is a crank-shaft passing through heads  $n^2$  and having an operating-handle  $n^5$  and a depending arm  $n^6$ , working, respectively, between pairs of pins  $n^7$   $n^8$  on opposite sides of the hood.



V is a reversible steam-engine of the rotary type suitably supported on the rear end of the truck and having a shaft  $v$  coupled with the fan-shaft S.

5 V' V<sup>2</sup> are flexible pipes serving to supply and exhaust the steam, and either of which can be connected with a pipe leading to the steam-valve under the control of the engineer.

The operation of the invention is as follows:

10 In their normal positions the cutters E E and scoops H H are raised, as is shown by full lines in Figs. 4 and 5. When it is desired to employ the machine, air-pipe N is coupled by its flexible tube with a pipe leading to an air-storage tank beneath the tender of a locomotive. By properly manipulating the air-valve the engineer admits air to said pipe, from which it passes by branch pipe  $n$  to cylinder L. As the piston in said cylinder begins to move downward, the tubular extension  $m$  thereof will have sufficient lost motion or play to actuate the tripping-lever  $k^2$ , forcing one end thereof against standard  $l$ , and releasing catch  $k$  from the slot in said standard, after 25 which section  $m'$  of the piston-rod will be actuated to force downward the rear end of pivoted lever F, which, being connected to the scoops H H, will throw them into the operative position shown in Fig. 1. As the rear 30 end of said lever descends, its forward end of course rises, and by its connections with shaft D turns said shaft into the position shown by full lines in Figs. 1 and 3 and throws the cutters or blades E E into action. These 35 blades will break up and cut the accumulated ice and snow and place it in condition to be gathered or scraped up by the scoops H H, from which it is delivered into the fan case or chamber U, and is forcibly expelled by the rapidly-revolving fan in a stream or shower through the opening in the hood or cover which is uncovered. Such impetus is given the snow 40 by the fan that it will be thrown some distance from the track and will not lodge alongside thereof. In the meantime air has passed from the main air-pipe through the branch pipe  $n'$  and triple valve O into auxiliary reservoir P until the pressure in such reservoir and the chamber of the triple valve is the same as 45 that in the main air-pipe and cylinder L. Consequently, if it is desired to raise the cutters and scoops to clear an obstruction, the engineer can readily do so by manipulating the air-valve to release the air from pipe N and cylinder L, when the pressure from the 50 auxiliary reservoir will become effective to force down piston R and the forward end of lever F, and through the connections described to raise the cutters and scoops, when they 55 will be locked in position by catch  $k$ , which will be caused to engage with its keeper by weighted arm  $k'$ .

60 The springs surrounding the pistons aid in restoring the pistons to their normal positions and also throw them to the tops of the cylinders, so that a full stroke will be given. If

it is desired to deliver the snow to the right side of the track, the lid or shutter  $n^x$  is opened and  $n^{x'}$  is closed, and the reverse is true when the conditions are such as to require its delivery to the left of the track. As the engine can be readily reversed, the fan can be driven in either direction desired. 7c

It is obvious that the machine can either be pushed in advance of the locomotive or drawn behind it, and that it can be driven at any rate of speed desired. 75

If the work to be performed is light, the machine can be moved along at a rapid rate of speed and the fan run at a nominal speed; but if heavy work is encountered it will be moved along slowly and the fan-wheel will be rapidly revolved. The snow will be thrown completely away from either side of the track desired, leaving no banks alongside thereof 80 on which drifts will be formed, and the track will be thoroughly cleaned, even in the deepest cuts. 85

The invention is simple in construction and reliable in operation. There are no complicated parts to become disarranged. All parts of the invention are standard appliances in use on railroads; and the entire machine is operated by two valves under the control of the locomotive-engineer. 90

The arrangement of air-cylinders for both raising and lowering the cutters and scoops in connection with the Westinghouse auxiliary reservoir and triple valve is peculiarly adapted to the work required, and furnishes 95 a powerful, positive, and quick-acting means for operating the cutters and scoops. 100

Many modifications could be made, and the parts could be differently arranged on the truck without departing from my invention. 105

What I claim, and desire to secure by Letters Patent, is—

1. In a machine for clearing snow from railroad-tracks, the combination of a truck, a rock-shaft fitted in hangers thereof carrying 110 a series of blades or cutters, a lever pivoted in hangers of the truck connected at one end with the rock-shaft, scoops connected with the other end of said lever, and compressed-air cylinders for operating the lever, substantially as and for the purpose specified. 115

2. The combination, with a truck, of cylinders each containing a piston, a compressed-air-supply pipe in communication with one of the cylinders, an auxiliary reservoir, a triple valve and a pipe in communication with the other cylinder, and means actuated by the pistons for breaking up and gathering snow, substantially as and for the purpose specified. 120

3. The combination, with a compressed-air cylinder and its piston, of a lever pivoted about midway its length in depending hangers, a scoop connected to one end of said lever, and a rock-shaft carrying blades or cutters connected to the other end of the lever, substantially as and for the purpose specified. 125 130



4. The combination, with a truck, of a pivoted lever and a rock-shaft carrying blades or cutters to which one end of said lever is connected with the other end of said lever, and cylinders having piston-rods attached to the lever, substantially as and for the purpose specified.
5. The combination, with a compressed-air cylinder and its piston, of a lever to one end of which the piston-rod is connected, a rock-shaft carrying blades or cutters connected with the other end of said lever, a second cylinder whose piston is connected with the forward end of the lever, and an auxiliary reservoir and triple valve, substantially as and for the purpose specified.
6. The combination, with a truck, of a shaft mounted in bearings thereon in line with the length of the truck, a fan carried by the shaft, a hood provided with converging walls placed over the fan, a hinged lid or cover on each side of the hood, and a reversible rotary engine for driving the shaft, substantially as and for the purpose specified.
7. The combination, with a pivoted lever and a device for actuating said lever, of a fixed shaft and scoops mounted to swing and have a longitudinal motion thereon, and springs between the scoops and hangers in which the shaft is mounted, substantially as and for the purpose specified.
8. The combination, with a truck, of a compressed-air pipe adapted to be connected with the air-storage tank of a locomotive, an air-cylinder connected with said pipe, an auxiliary reservoir and triple valve, a compressed-air cylinder in communication with the triple valve, and cutting and scraping devices actuated by said cylinders, substantially as and for the purpose specified.
9. The combination, with a truck, of a lever pivoted in hangers thereon, scoops connected to one end of said lever, blades connected to the forward end of said lever, and cylinders and pistons for actuating the blades and scoops, substantially as and for the purpose specified.
10. The combination, with the frame and hangers, of a shaft, scoops pivoted thereon, and springs between the scoops and hangers for permitting them a slight longitudinal movement on the shaft, substantially as and for the purpose specified.
11. The combination, with the pivoted lever and cutting and scraping devices connected therewith, of mechanism for actuating said lever, a latch, and a tripping-lever for releasing said latch, substantially as and for the purpose specified.
12. The combination, with a pivoted lever and connected snow cutting and gathering devices, of a pressure-cylinder, a piston whose rod is in sections, and a latch connected to the lever, substantially as and for the purpose specified.
13. The combination, with a lever pivoted in hangers depending from the truck-frame, devices for cutting and gathering snow connected to the respective ends of said lever, a latch pivoted to the lever, and a device for tripping the latch, substantially as and for the purpose specified.
14. The combination, with a truck, of a pivoted lever, cutters for breaking up ice and snow, and scoops for collecting the same connected to said lever, a chamber for receiving material from the scoops, a fan, a reversible steam-engine for driving said fan, and a flexible pipe adapted to connect the cylinder of the engine with a pipe leading to a steam-valve in the cab of a locomotive, substantially as and for the purpose specified.
15. The combination, with the pivoted lever and devices actuated thereby, of a pressure-cylinder, a piston having a sectional rod, a weighted catch or hook pivoted to the lever, and a tripping-lever having a slot through which the lower section of the piston-rod passes, substantially as and for the purpose specified.
16. The combination, with the fan, of a detachable hood or cover provided with converging walls having openings closed by lids or shutters of arrow-headed latches having spring-arms and means for releasing said latches, substantially as and for the purpose specified.
17. The combination, with the fan, of a detachable hood or cover provided with converging walls having openings, lids, or shutters, arrow-headed latches, and a crank-shaft having an operating-handle and a depending arm working, respectively, between pairs of pins on opposite sides of the hood, substantially as and for the purpose specified.
18. The combination, with a truck, of two cylinders mounted thereon, each containing a piston, a pipe communicating with one of said cylinders, an auxiliary reservoir and triple valve, a pipe leading from the triple valve to the other cylinder, a lever, and cutters and scoops connected thereto, substantially as and for the purpose specified.
19. The combination, with a track and track-clearing appliances, of cylinders each containing a piston and air-supply pipe in communication with one cylinder, an auxiliary reservoir and triple valve in communication with the other cylinder, and means connecting the pistons with the track-clearing devices, substantially as and for the purpose specified.
20. The combination, with pivoted scoops and cutters, of a lever connected therewith, a cylinder containing a piston connected with the lever, and a latch carried by the lever, substantially as and for the purpose specified.
21. The combination, with a truck, of a lever, a rock-shaft carrying cutters and scoops connected with the lever, cylinders the pistons of which are each connected with the lever,



an air-supply pipe communicating with one cylinder, and an auxiliary reservoir and triple valve communicating with the other cylinder, substantially as and for the purpose specified.

auxiliary reservoir, and a triple valve, substantially as and for the purpose specified. 10

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM MCINTOSH.

Witnesses:

WM. H. BLODGETT,

FRANK D. MERCHANT.

22. The combination, with a truck and a pivoted lever and cutters and scoops connected to said lever, of two air-pressure cylinders, an