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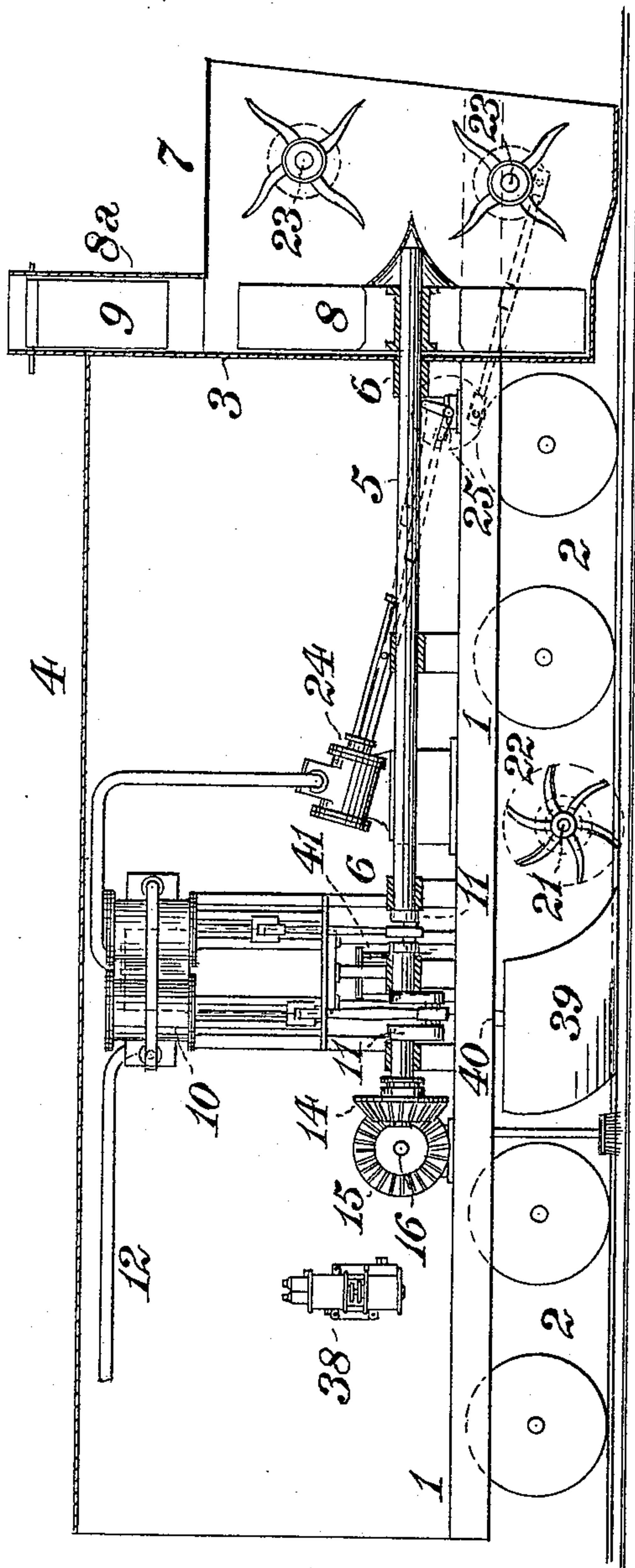
5 Sheets—Sheet 1.

H. J. SMALL & T. W. HEINTZELMAN.
SNOW PLOW.

No. 451,138.

Patented Apr. 28, 1891.

FIG. 1.



WITNESSES:

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(No Model.)

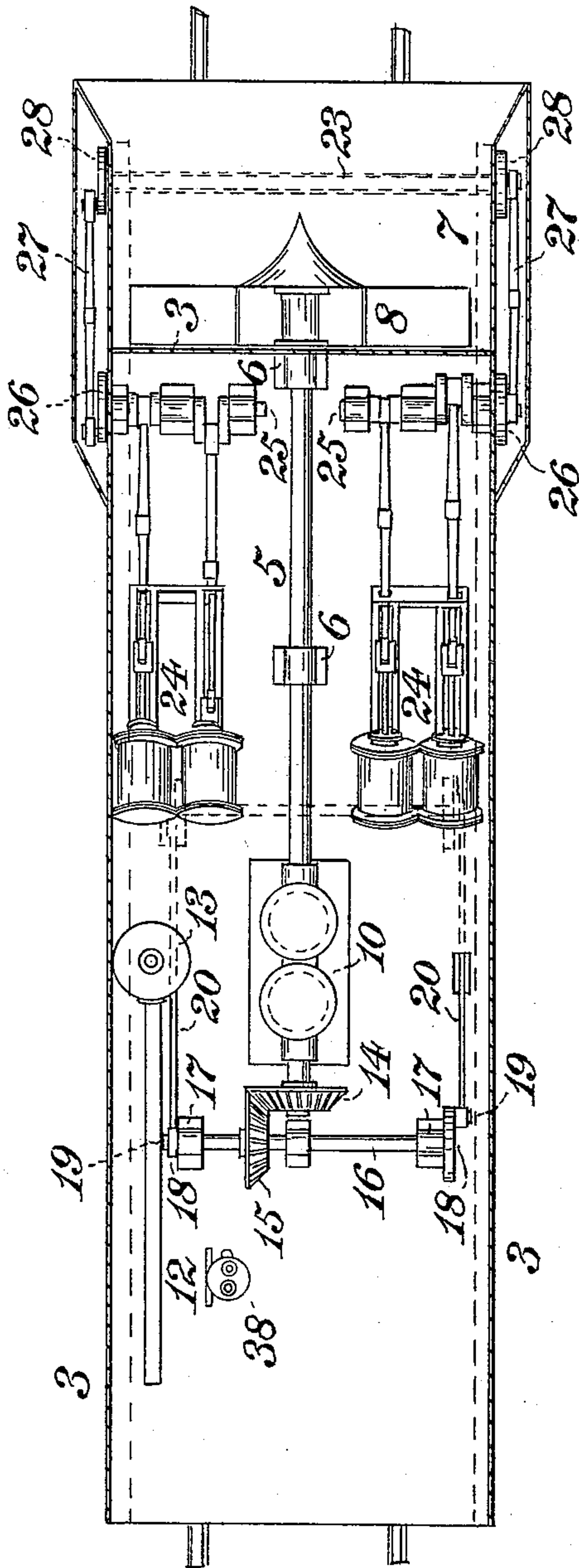
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FIG. 2.-



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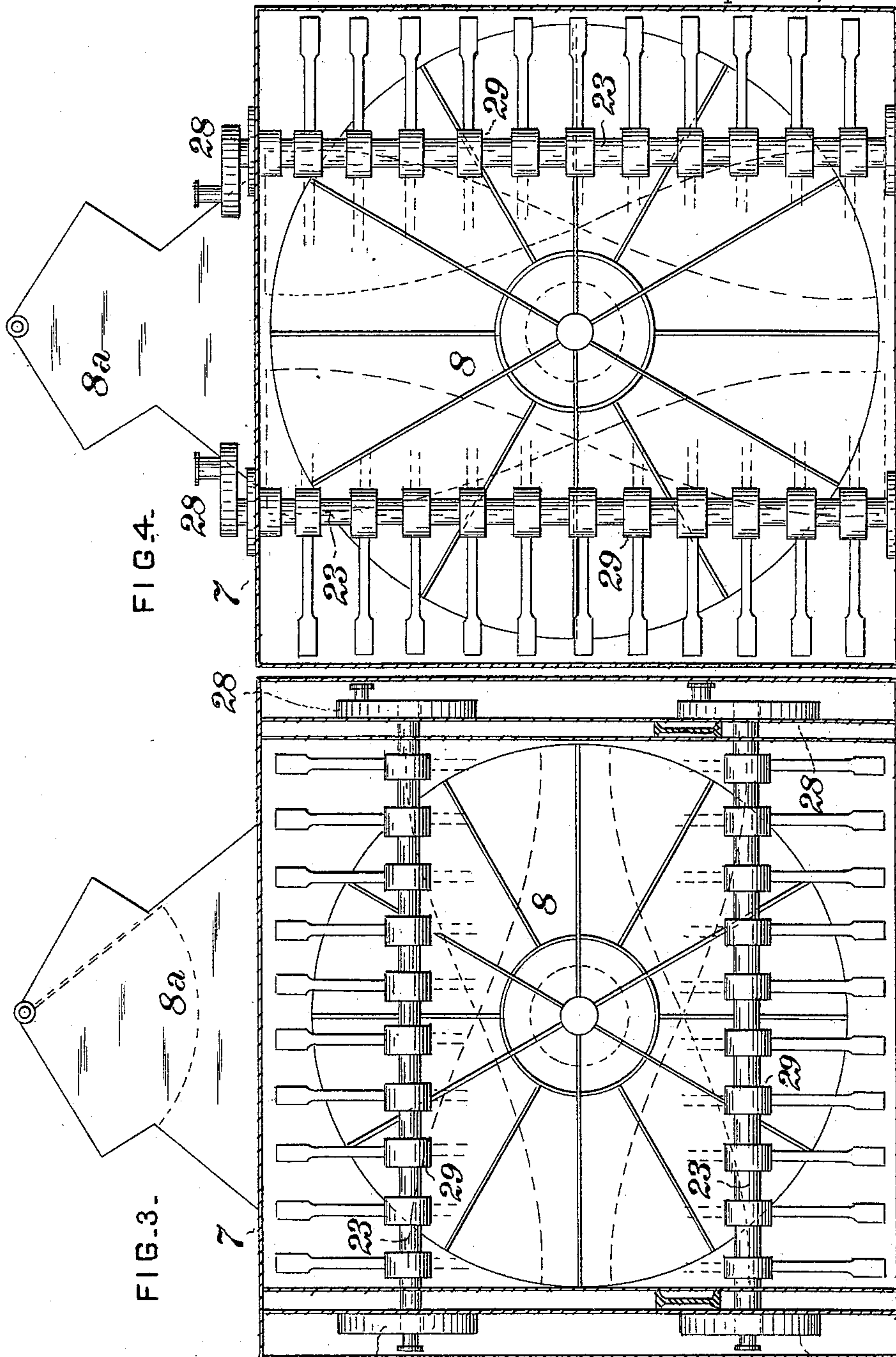
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FIG. 6.

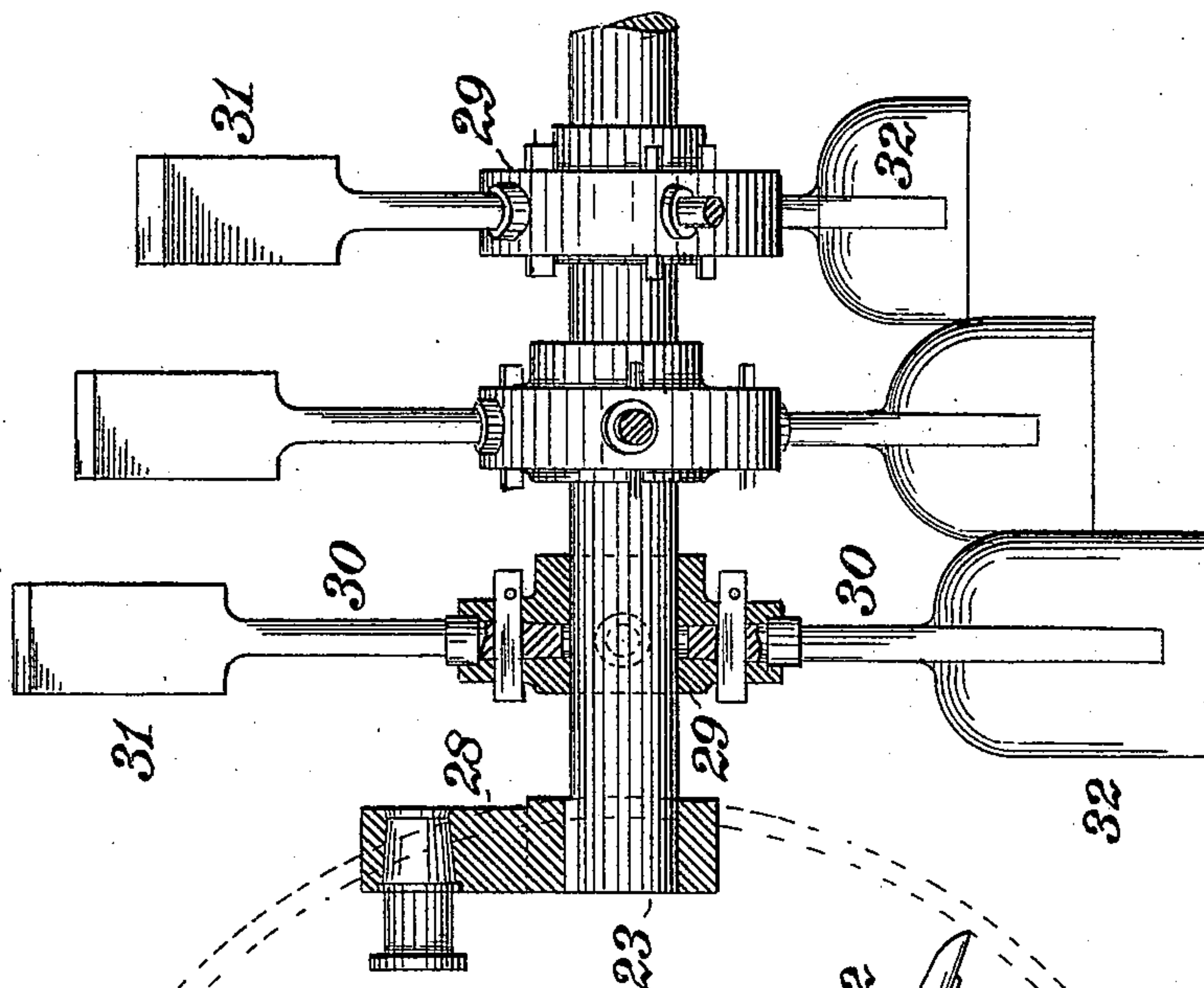
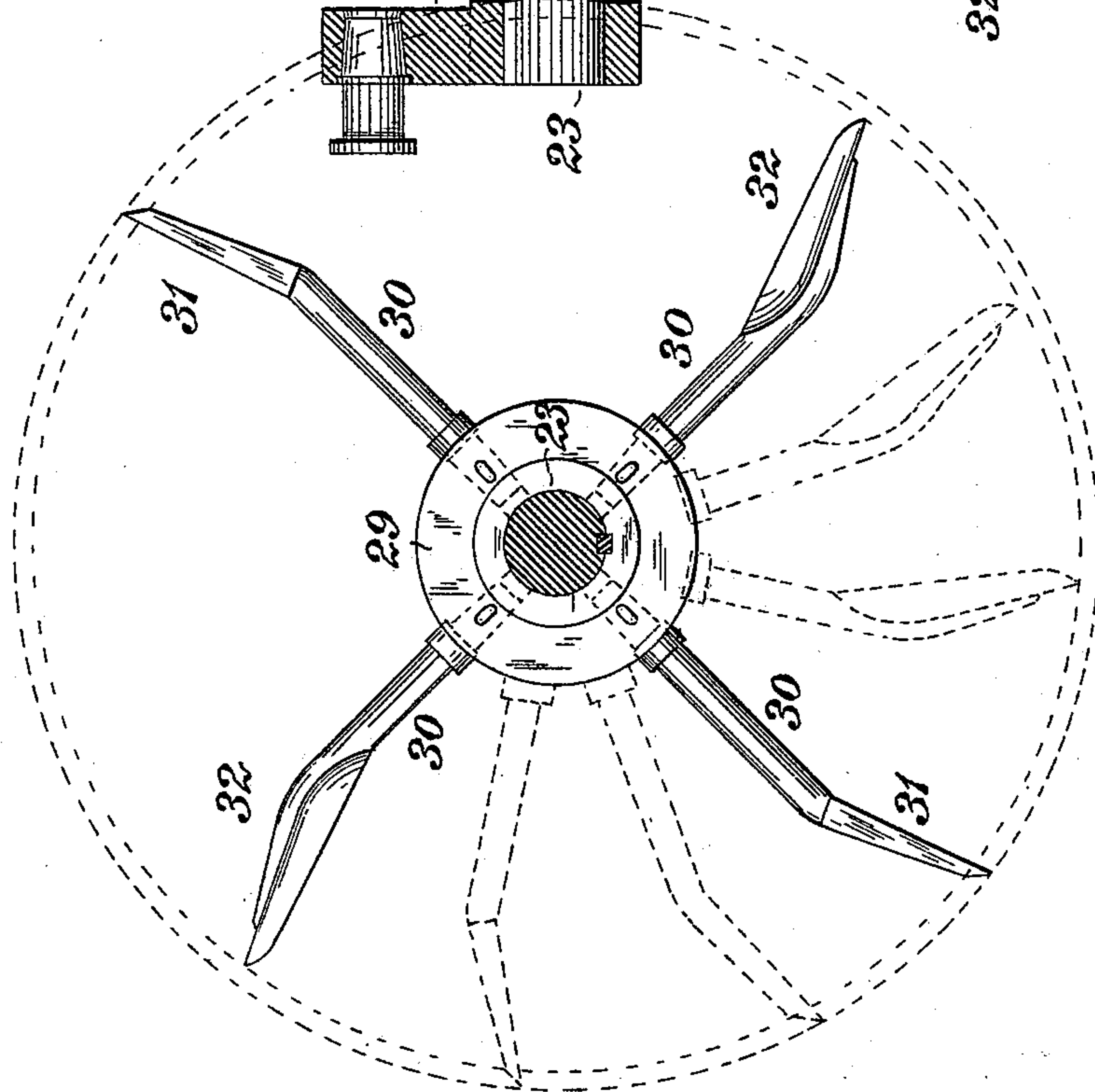


FIG. 5.



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5 Sheets—Sheet 5.

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SNOW PLOW.

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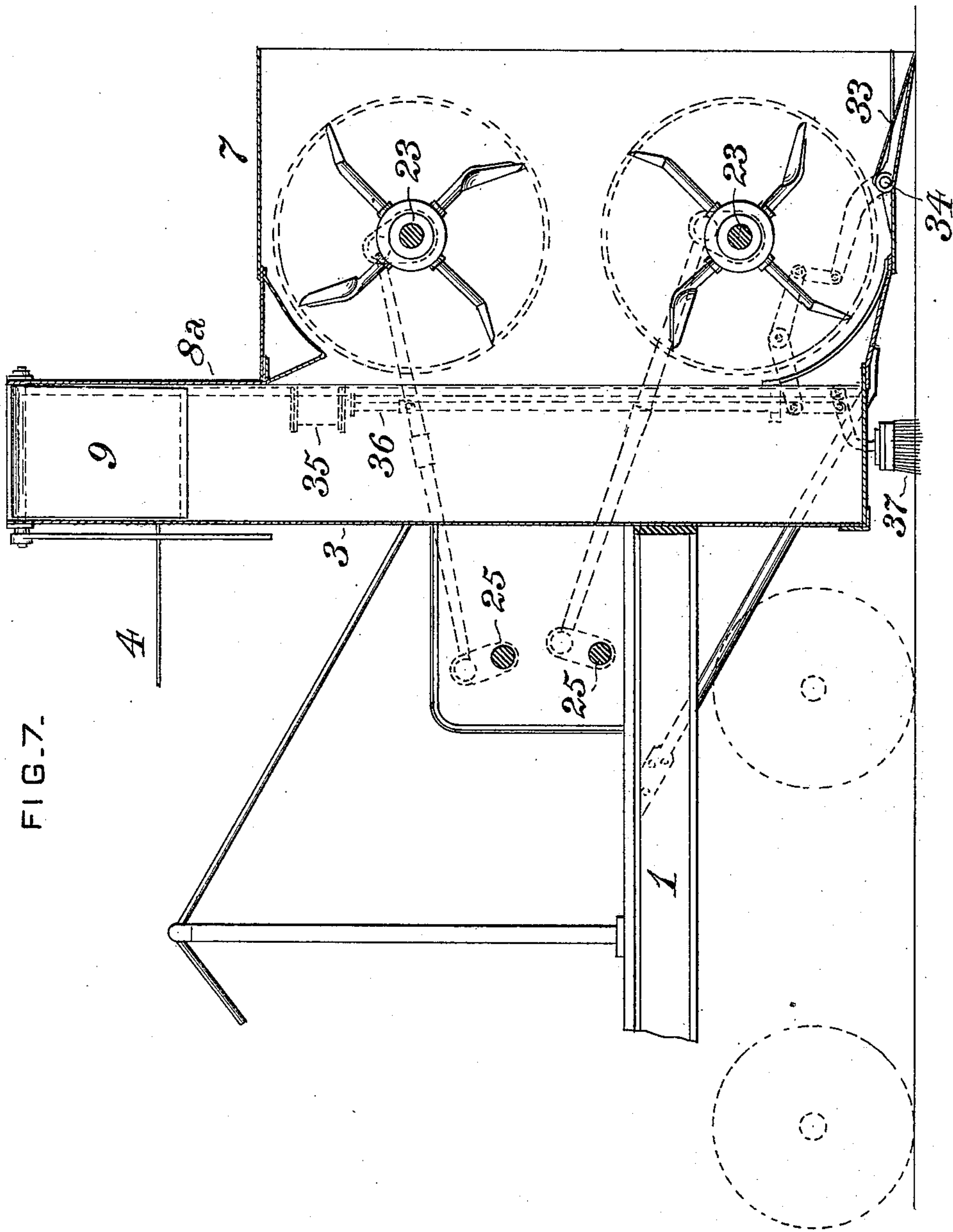


FIG. 7.

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UNITED STATES PATENT OFFICE.

HENRY J. SMALL AND TAYLOR W. HEINTZELMAN, OF SACRAMENTO,
CALIFORNIA.

SNOW-PLOW.

SPECIFICATION forming part of Letters Patent No. 451,138, dated April 28, 1891.

Application filed December 1, 1890. Serial No. 373,193. (No model.)

To all whom it may concern:

Be it known that we, HENRY J. SMALL and TAYLOR W. HEINTZELMAN, both of Sacramento, in the county of Sacramento and State of California, have invented a certain new and useful Improvement in Snow-Plows, of which improvement the following is a specification.

The object of our invention is to provide effective and desirable means for breaking up and pulverizing accumulations of snow on, and clearing the same from, railroad-tracks, particularly when the snow has become hard by reason of thawing and subsequent freezing, or when in a moist condition, so as to be subject to be formed into a compact mass by a comparatively slight pressure.

A further object of our invention is to attain a reduction of weight and length and a simplification of mechanism relatively to appliances heretofore known and applied to a greater or less extent in practice.

To this end our improvement consists in certain novel devices and combinations hereinafter fully set forth.

In the accompanying drawings, Figure 1 is a vertical longitudinal section through a snow-plow embodying our invention; Fig. 2, a plan or top view with the roof removed; Fig. 3, a front view in elevation; Fig. 4, a similar view illustrating a modification; Fig. 5, a transverse section, on an enlarged scale, through one of the cutter-shafts; Fig. 6, a side view in elevation of a portion of the same with the cutters attached; and Fig. 7, a vertical longitudinal section, on an enlarged scale, through the forward portion of the plow, illustrating the movable apron and its operating mechanism.

In the practice of our invention we provide a substantial car-frame 1, which is, as in this instance, preferably supported adjacent to each of its ends upon a truck 2, and is provided with suitable side and end vertical framing, to which are connected a casing 3 and roof 4 for inclosing and protecting the operating mechanism.

The plow is designed to be pushed by locomotive-engines, and in order to reduce its weight it is not provided with a steam-boiler,

steam for actuating the engines which operate its fan and cutters being supplied through a suitable connecting-pipe, either from the boiler of a locomotive coupled to the plow or from a boiler placed upon a separate car, as may be preferred.

A horizontal fan-shaft 5 is journaled in bearings 6 centrally on the car-frame, its forward end projecting through the front end of the car body or casing 3 into an open-ended front casing 7, secured thereto. A discharging-fan 8, having a series of blades adapted when the fan is rotated to peripherally project snow which enters the casing 7 is secured upon the shaft 5 below a discharge-spout 8^a, which is connected to the top of the casing 7, and is provided with a swinging door 9, by which one or the other of two lateral discharge-openings in its top may be closed, as desired, in order that snow discharged by the fan may be thrown to either side of the track, as circumstances may require.

The shaft 5 and fan 8 are rotated by a pair of vertical engines 10, which are coupled to the pins of cranks 11 near its rear end, and are supplied with steam by a pipe 12, which is connected to the boiler of a locomotive coupled to the plow or to a boiler on a separate car, as preferred. In the former case the steam from the locomotive is used only for actuating the engines of the plow, the latter being propelled by one or more additional locomotives. The supply-pipe 12 leads into a steam drum or receiver 13, and thence to the engines, a steam-trap 41 being provided to carry off water of condensation.

A bevel-gear 14, secured upon the rear end of the fan-shaft 5, engages a corresponding gear 15 on a transverse horizontal counter-shaft 16, journaled in bearings 17 above the car-frame 1. Cranks 18 are secured upon the ends of the counter-shaft, and the pins 19 of said cranks are coupled by connecting-rods 20 to crank-pins upon a transverse horizontal flanger-shaft 21, mounted in bearings below the car-frame. Flangers 22, each composed of a series of alternate breaker and shovel arms fixed to a central hub, are secured upon the shaft 21 in such positions that in the ro-

tation of the shaft their arms rotate close to each of the track-rails and act to clear away snow and ice from the inner sides thereof.

Two transverse horizontal cutter-shafts 23 are journaled in bearings connected to the car-frame in the front casing 7, above and below the axial line of the fan-shaft 5, respectively, each of said shafts carrying a continuous cutter or a series of picks or breakers and shovels, as presently to be described. Rotation is imparted to each of the cutter-shafts by a pair of horizontal or inclined engines 24, (one pair being provided for each cutter-shaft,) the crank-shafts 25 of said engines carrying cranks 26 on their outer ends, which are coupled by connecting-rods 27 to cranks 28 on the cutter-shafts. Said shafts are rotated in opposite directions, respectively, so as to direct the snow which is broken up and pulverized by their cutters toward the horizontal central plane of the fan-shaft, in order that it may be discharged by the centrifugal action of the fan-blades.

In the modification shown in Fig. 4 the cutter-shafts are arranged vertically instead of horizontally, as above described, the driving-cranks being in such case secured upon their upper ends, and the crank-shafts of their actuating-engines being likewise vertical instead of horizontal.

Each of the cutter-shafts carries a disintegrating device for breaking up and pulverizing masses of snow with which it is brought in contact in the forward movement of the plow, and delivering the snow which it has acted upon to the rotating fan, to be ejected laterally through the top discharge-spout 8^a of the front casing 7. This disintegrating device may be either a single blade of metal of helical or twisted form or a series of separate arms carrying breakers or shovels upon their outer ends. In the instance shown a series of collars or hubs 29 is secured upon each of the cutter-shafts 23, the collars being keyed or otherwise firmly connected thereto. Each collar is provided with holes or sockets in which are fixed arms 30, which carry upon their outer ends picks or breakers 31 and shovels 32, the pick-arms and shovel-arms being alternated in each collar, and the points of the picks projecting slightly farther from the axes of the cutter-shafts than the outer edges of the shovels. The several collars of each cutter-shaft are preferably fixed thereon in such relation that the extremities of the picks and shovels shall be arranged helically or in the lines of screw-blades around the shafts, in order to exert a shearing cut upon the snow; but they may be set in parallel lines with the shafts, if preferred. The number and relative arrangement of the cutting members may be varied in the discretion of the constructor, and will depend to some extent upon the character and conditions of the work to be performed.

The preliminary action of the disintegrating devices carried by the revolving cutter-

shafts causes the snow to be delivered to the discharging-fan in a finely-divided state, and thereby correspondingly promotes and facilitates the action of the fan.

In order to provide for scraping off and cutting away snow and ice down to the level of the tops of the rails, a transverse plate or apron 33 is fixed to a shaft 34, mounted in bearings on the sides of the front casing, the apron extending across the casing and forming a movable front section for the bottom thereof. The apron is raised and lowered and held in desired position by the application of fluid pressure acting upon the pistons of a pair of vertical cylinders 35, supported near the rear of the casing, the piston-rods 36 of said cylinders being coupled through intermediate lever-and-link connections to arms on the apron-shaft 34. A pair of steel-wire track-brooms 37 is suspended from the rear of the casing adjacent to each of the track-rails, and is also coupled to the piston-rods 36, so as to be raised and lowered and held in position thereby in conformity with the apron. By means of the above construction the snow and ice scraped up from below the bottom line of the casing are carried back to and thrown out by the fan, and the rails are left clean as the plow advances. Compressed air is by preference employed for actuating the pistons of the cylinders 35, an air-pump 38 being provided for its supply. The air-pump may also serve to supply compressed air for operating a mold-board to be presently described and for actuating the piston of a brake-cylinder to apply brake-shoes to the wheels of the plow when required.

In order to discharge snow or ice in places where either side of the track may be obstructed, we provide a reversible mold-board 39, which is in the form of a stout sheet of metal, curved so as to present a concave face in the direction of the front of the plow, and extends across the track at an angle to the longitudinal center line of the plow. The mold-board is suspended from the lower side of the car-frame 1 in rear of the flangers 22 in any suitable manner, as by chains or hinge-connections, so as to admit of being raised and lowered and the direction of its inclination reversed, as may from time to time be required. A guide-bar 40 may be placed on either side of the mold-board to maintain it in vertical position while being moved, and its movement may be effected either by a fluid-pressure cylinder or by lever attachments for operation by hand.

We claim as our invention and desire to secure by Letters Patent—

1. In a railroad snow-plow, the combination of a supporting-frame, an open-ended front casing connected thereto, a discharging-fan mounted in bearings on the frame and adapted to rotate in said casing, cutter-shafts mounted in bearings in the front casing on opposite sides of the fan shaft, cut-

ters or disintegrating devices fixed upon the cutter-shafts, a movable plate or apron connected to and forming the front lower section of said casing, and a fluid-pressure cylinder having its piston-rod coupled to said movable apron, substantially as set forth.

2. In a railroad snow-plow, the combination of a supporting-frame, an open-ended front casing connected thereto, a discharging-fan mounted in bearings on the frame and adapted to rotate in the casing, and a reversible mold-board having a curved face and suspended below the frame in rear of the discharging-fan, substantially as set forth.

3. In a railroad snow-plow, the combination of a supporting-frame, an open-ended front casing connected thereto, a discharging-fan mounted in bearings on the frame and adapted to rotate in the casing, disintegrators fixed upon cutter-shafts journaled in bearings in the casing on opposite sides of the fan-shaft, a movable apron connected to and forming the front lower section of the casing, a fluid-pressure cylinder having its piston-rod coupled to said movable apron, a flanger fixed upon a shaft journaled below the frame in rear of the discharging-fan, motor-engines coupled to and rotating the fan-shaft, cutter-shafts, and flanger-shaft, and steam-supply pipes extending from the engines to a point suitable for connection with a steam-generator upon a separate vehicle, substantially as set forth.

4. In a railroad snow-plow, the combination of a supporting-frame, an open-ended front casing connected thereto, a discharging-fan mounted in bearings on the frame and adapted to rotate in said casing, cutter-shafts mounted in bearings in the front casing on opposite sides of the fan-shaft, cutters

or disintegrating devices fixed upon the cutter-shafts, a movable plate or apron connected to and forming the front lower section of the casing, a fluid-pressure cylinder having its piston-rod coupled to said movable apron, and an air-compressing pump fixed upon the frame and adapted to supply said fluid-pressure cylinder, substantially as set forth.

5. In a railroad snow-plow, the combination of a supporting-frame, an open-ended front casing connected thereto, a discharging-fan mounted in bearings on the frame and adapted to rotate in said casing, a movable plate or apron connected to and forming the front lower section of the casing, a pair of steel-wire track-brooms connected to the casing in rear of the movable apron and adjacent to the inside lines of the rails on which the plow traverses, and a fluid-pressure cylinder having its piston-rod coupled to the movable apron and to the track-brooms, substantially as set forth.

6. In a railroad snow-plow, the combination of a supporting-frame, an open-ended front casing connected thereto, a longitudinal fan-shaft mounted in bearings on the frame, a discharging-fan fixed upon said shaft in the front casing, a flanger-shaft mounted in bearings below the frame and in rear of the discharging-fan, a motor-engine coupled to and rotating the fan-shaft, a counter-shaft connected by gearing with the fan-shaft, and connections coupling the counter-shaft and flanger-shaft, substantially as set forth.

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