No. 618,148. Patented Jan. 24, 1899.

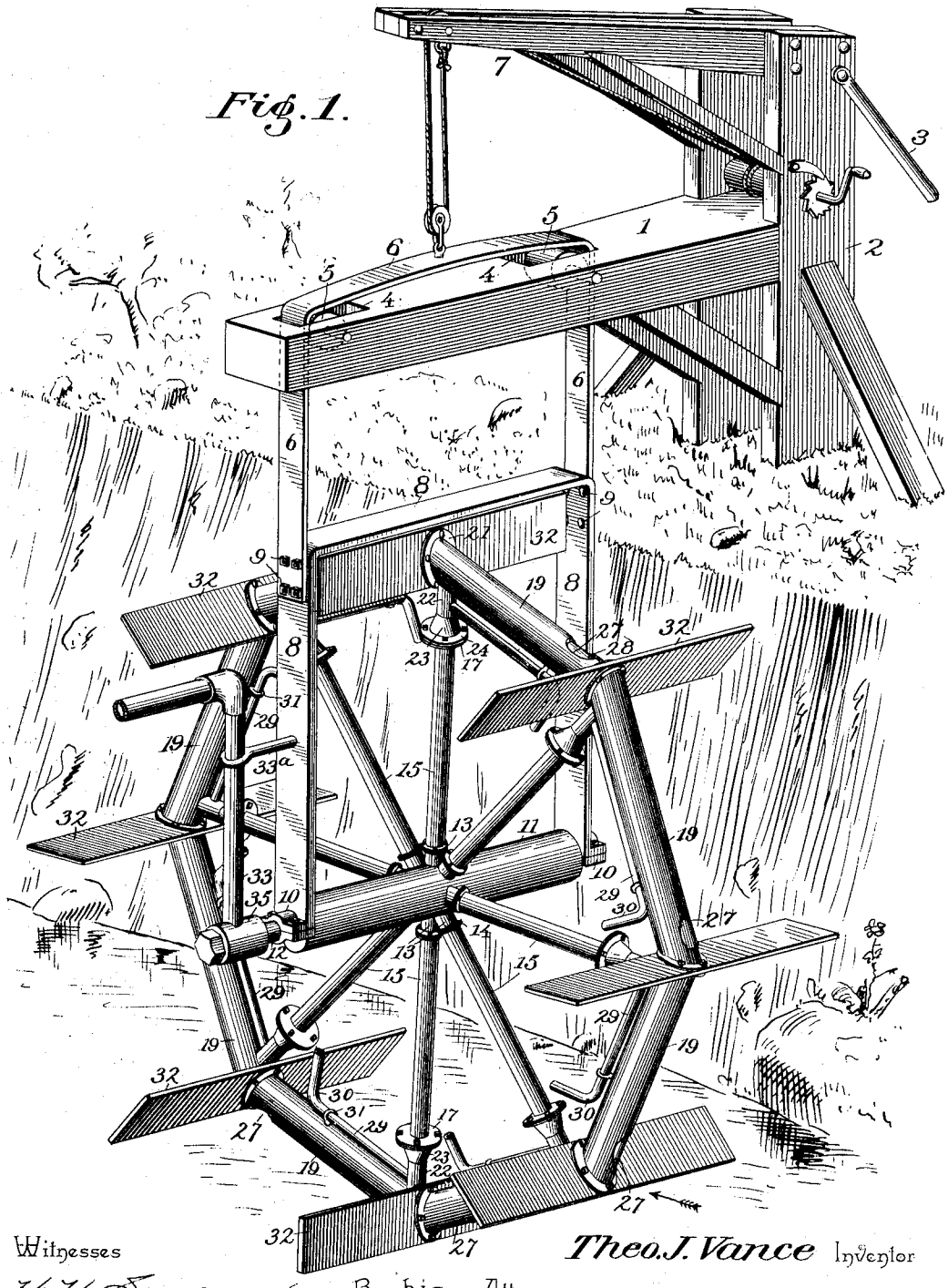
T. J. VANCE.

CURRENT WHEEL.

(Application filed May 11, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.



Witnesses

H. H. Simms

H. J. Bendorf

Theo. J. Vance Inventor

By his Attorneys.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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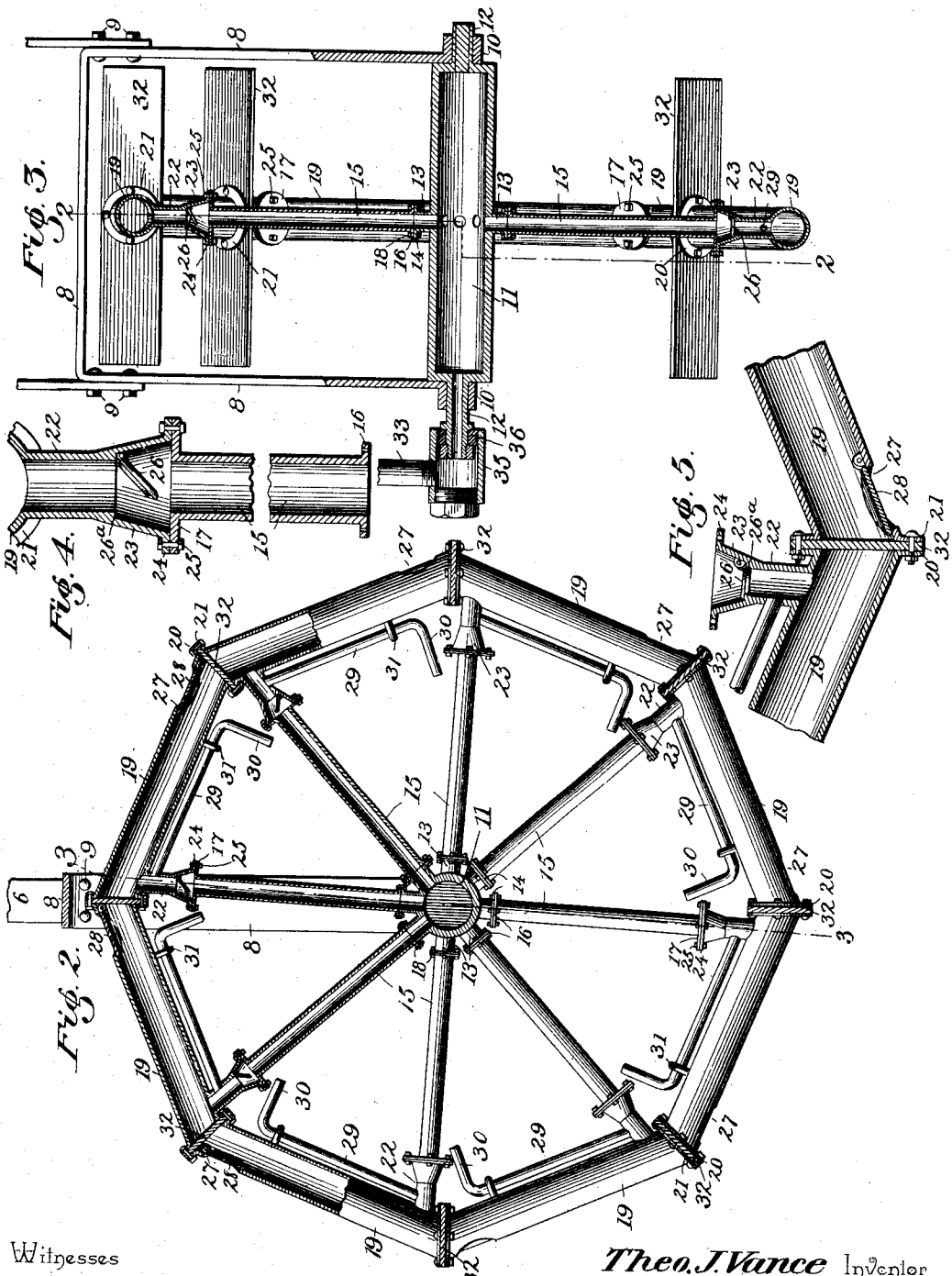


Fig. 3.

Fig. 4.

Fig. 5.

Fig. 2.

Witnesses
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By his Attorneys,
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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

THEODORE JAMES VANCE, OF ROSEBUD, MONTANA.

CURRENT-WHEEL.

SPECIFICATION forming part of Letters Patent No. 618,148, dated January 24, 1899.

Application filed May 11, 1898. Serial No. 680,374. (No model.)

To all whom it may concern:

Be it known that I, THEODORE JAMES VANCE, a citizen of the United States, residing at Rosebud, in the county of Custer and State of Montana, have invented a new and useful Current-Wheel, of which the following is a specification.

My invention relates to improvements in current-wheels for raising water for irrigating and other purposes; and the primary object that I have in view is to provide an improved structure for raising water to the greatest height possible with a given diameter of the wheel and to deliver the water to the point of discharge with the least possible waste of energy.

A further object of the invention is to overcome back flow and pressure of the water which may be partially elevated and contained in certain parts of the wheel during the rotation thereof under the influence of the swiftly-moving current acting against the wheel-paddles and also to permit the air to escape from the rim-sections during the operation of filling each rim-section with water in the rotation of the wheel.

A further object of the invention is to provide for the vertical adjustment of the wheel, so as to withdraw it from service in the event of an increase in the volume of the water in the stream and the floating of heavy drift or ice, and, finally, to simplify the construction with a view to promoting the strength and durability of the parts and insuring efficiency in the operation of the wheel.

With these ends in view the invention consists in the combination of elements and in the construction, arrangement, and adaptation of parts, as will be hereinafter fully described and claimed.

To enable others to understand the invention, I have illustrated the preferred embodiment thereof in the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a perspective view of a current-wheel suspended in position for operation. Fig. 2 is a vertical sectional elevation in the plane of the radial spokes and sections of the rim on the dotted line 2 2 of Fig. 3. Fig. 3 is a vertical transverse sectional elevation through the wheel in the plane of the tubular shaft thereof and indicated by the dotted line 3 3 of Fig. 2. Fig. 4 is an enlarged detail sectional view through one of the tubular spokes forming a part of the wheel structure. Fig. 5 is an enlarged sectional elevation through one of the rim-sections.

Like numerals of reference denote like and corresponding parts in each of the several figures of the drawings.

1 designates the overhead suspension-beam, which is carried by a suitable framework 2, erected on the bank of a stream and held firmly in place thereon by a suitable foundation, said frame being braced by the stays 3. The suspension-beam 1 is designed to overhang the stream, and it is provided with vertical slots 4, that receive the guide sheaves or rollers 5.

The current-wheel of my invention has its shaft journaled in a frame which is supported by a bail 6, that is slidably fitted in the slots of the beam 1 to travel against the sheaves or rollers 5, and with this suspension-bail is combined a suitable hoisting-tackle 7, that serves to elevate the bail, and with it the wheel, so as to withdraw the wheel from the current during a freshet and to prevent injury to the wheel by floating debris or ice.

The wheel-frame 8 may be of any suitable construction, and it is fitted within the vertical members of the bail, to which the wheel-frame is rigidly bolted.

In the drawings I have shown bolts 9 for uniting the wheel-frame and bail together; but it is evident that the ends of the bail may be extended to receive the journals of the wheel-shaft, thus making the bail serve the purpose of the wheel-frame.

The lower ends of the wheel-frame are provided with shaft-bearings 10, which aline with each other to receive the journals of the wheel-shaft 11. This wheel-shaft is tubular or cylindrical in form and of large diameter, and at its ends said shaft has the tubular journals 12, which are properly mounted in the bearings 10 of the wheel-frame, so as to insure free rotation of the shaft 11 in said frame. At a point intermediate of its length

the wheel-shaft is constructed with a series of short nipples 13, arranged radially thereto and preferably in the same vertical plane, and these nipples are flanged at their outer extremities to enable them to be properly joined to the radial spokes 15. Any desired number of these radial spokes and of the rim-sections 19 may be employed in the construction of my improved current-wheel, and rim-sections 19 are arranged angularly, so as to impart a polygonal appearance to the rim of the wheel.

Each radial spoke 15 is hollow, preferably tubular, and at its inner end said spoke is provided with a flange 16, adapted to register with the flange 14 on the outer extremity of one of the radial nipples 13, said flanges 14 and 16 being united rigidly together by the bolts 18 to couple the tubular spoke firmly to the tubular shaft and thus provide for the uninterrupted communication of the hollow spoke with the similar shaft. The outer end of each radial spoke is flanged, as at 17, to enable it to be properly joined with a nipple of one of the rim-sections, a rim-section 19 being combined with each tubular spoke, and said rim-sections being independent of every other rim-section, so that the rim-sections do not communicate one with the other. Each tubular rim-section 19 is provided at its ends with the angular flanges 20 21, and these flanges are disposed at acute angles to the axial line of the rim-section, whereby the series of rim-sections may be properly assembled together and their ends may be united with the radial paddles of the wheel to present a substantial and durable structure. Each rim-section is provided near one end with a radial nipple 22, which is arranged in alinement with one of the tubular wheel-spokes, and the inner end of this nipple is flared or enlarged, as at 23, to provide a valve boxing or chamber adapted to contain a check-valve 26, which prevents back pressure in the spoke, as will presently appear. The inner extremity of the flared end 23 of the nipple 22, forming a part of each tubular rim-section, is flanged externally, as at 24, so as to register with the flange 17 on the outer end of one of the tubular wheel-spokes, and the flanges 24 and 17 of the rim-nipple and spoke are joined rigidly together by bolts 25, whereby the tubular rim is adapted to communicate with the tubular spoke to which it may be united. The flared length of the rim-nipple 22 is provided interiorly with a valve-seat 26^a, that accommodates a check-valve 26 of any suitable or preferred construction.

The nipple 22 of each rim-section is arranged near one end thereof, and near its other end the rim-section is provided with a water-ingress port 27, which is formed in the outer face or side of the rim-section, and this port is adapted to be closed under certain conditions in the service of the wheel by means of a check-valve 28 of any suitable or preferred construction. This check-valve 28 is arranged or hung to open inwardly into the tubular rim-section, so that when the rim-section is immersed in the water the valve 28 will open to permit of the inflow of water to the section 19, and the water thus admitted to the rim-section is confined therein against escape through the port 27 in the rotation of the wheel by means of the valve 28, which is closed by the internal pressure of the water. The water confined in the tubular rim-section is free to pass through the nipple 22 and past the check-valve 26 into the tubular spoke, from whence the water flows into the hollow wheel-shaft, to be discharged from the latter to an outlet-pipe, to be hereinafter described.

When the water is discharged from the hollow rim-section into the spoke and thence to the wheel-shaft, air accumulates in the nipple 22 and rim-section, and it is desirable to permit this air to escape on the ingress of water to the rim-section. I attain this end by the employment of a vent-pipe 29, which is arranged within the plane of the rim-section, and one end of this air-vent pipe is suitably attached to the rim-nipple 22, while its other end is bent to form an elbow 30, which extends inwardly toward the wheel-shaft a suitable distance. This air-vent pipe is held in position by its attachment to the nipple and by means of a brace 31, which is secured to the rim-section and engages with the pipe 29. By arranging the air-vent pipe to extend in advance of the rim-nipple to which it is connected and giving an elbow shape to the open end of the pipe 29 the necessity for a check-valve therein is obviated and the water is prevented from flowing through the pipe during the rotation of the wheel and the discharge of the water from the rim-section to the tubular spoke.

In order to impart the necessary rotation to the current-wheel by the action of the swiftly-moving current thereon, I employ a series of paddles 32, which are securely clamped between the flanged ends of adjacent rim-sections. Each paddle is of large size to enable the current to properly act against the same, and said paddle is arranged radially to the wheel-shaft. The paddle is interposed between the adjacent flanged ends of a pair of rim-sections, and the bolts which unite the rim-sections together pass through the paddles, whereby the paddles are clamped or held firmly in place between the rim-sections, and they serve to cut off communication from one rim-section to the other.

The water delivered to the tubular wheel-shaft is discharged through an outlet-pipe 33, which is operatively coupled to the tubular shaft, so as to receive the water from the shaft and to discharge the same in any suitable way. This outlet-pipe 33 is arranged alongside of a part of the wheel-frame, to which it is attached by a suitable brace 33^a. The lower end of this pipe 33 is connected

with a coupling 35, which is screwed to a gland 36, that is connected to one of the tubular trunnions or journals 12 of the wheel-shaft, and one end of the wheel-shaft is thus connected by the coupling to the outlet-pipe. The journal of the wheel-shaft is free to rotate in the coupling-gland, and the parts constitute a water-tight rotary joint between the rotating wheel-shaft and the stationary delivery-pipe. The hollow journal at the other end of the wheel-shaft is closed in a suitable way, or, if desired, a similar outlet-pipe and water-tight joint may be combined with said journal to discharge water from both ends of the wheel-shaft. I may also couple the discharge or outlet pipe to the wheel-shaft by means of a coupling which will permit the outlet-pipe to be raised or lowered.

In the operation of the structure the current-wheel is lowered to submerge the lower paddles and rim-sections in the swiftly-moving current of water, and the impact of the current against the paddles imparts the desired rotary motion to the wheel. As each rim-section is submerged in the water its check-valve 28 opens inwardly to expose the port 27 and thus permit water to accumulate in the hollow rim-section. The admission of water to the rim-section displaces the air therein, which finds its vent through the pipe 29, and as the wheel rotates the rim-section, filled with water, is carried upwardly, so that the water flows from the rim-section through the nipple 22 and the spoke into the tubular wheel-shaft. During the elevation of the rim-section the valve 28 closes and prevents the escape of water through the port 27, and as the spoke and rim-section again approach the water in the continued rotation of the wheel the check-valve 26 in the spoke is closed by the pressure of any water which may be contained therein, thus wholly overcoming back pressure and the escape of the water either from the rim-section or the tubular spoke. As each rim-section and spoke discharges water successively to the wheel-shaft during the rotation of the wheel, the water is continuously supplied to the shaft and the valves overcome back pressure and escape of water. The wheel-shaft delivers the water through the hollow trunnion or journal to the outlet-pipe and the water is discharged practically in a continuous stream therefrom.

I do not strictly confine myself to the particular means for suspending the water-wheel nor for adjusting the latter vertically between the banks of a stream, as these devices may be modified by a mechanic or engineer within wide limits and without involving a departure from the invention, which resides in the water-wheel having its parts constructed and arranged for service in the manner and for the purposes set forth.

I am aware that changes in the form and proportion of parts and in the details of construction may be made by a skilled mechanic without departing from the spirit or sacrificing the advantages of the invention, and I therefore reserve the right to make such modifications as clearly fall within the scope of the invention.

Having thus described the invention, what I claim is—

1. A current-wheel consisting of a hollow shaft, a series of valved hollow spokes, and a series of valved rim-sections which are cut off from communication one from the other and which communicate separately with the hollow spokes, substantially as described.

2. A current-wheel comprising a hollow shaft, a series of hollow valved spokes communicating therewith, a series of rim-sections communicating separately with said spokes and each rim-section provided with a water-inlet, and paddles clamped between the rim-sections and cutting off communication from one rim-section to the other, substantially as described.

3. A current-wheel consisting of a tubular shaft, a series of hollow valved spokes communicating therewith, a series of rim-sections connected separately with the spokes and each having a water-inlet, the paddles, and air-vents communicating with the rim-sections at the end thereof opposite to the end having the water-inlet, substantially as described.

4. A current-wheel consisting of a tubular shaft, a series of hollow spokes provided with the check-valves, the hollow rim-sections communicating with said spokes and each having a water-inlet, the paddles clamped between the rim-sections, and air-vent pipes communicating with the spokes between the check-valves therein and the rim-sections, substantially as described.

5. A current-wheel consisting of a tubular shaft, a series of hollow spokes provided with check-valves, a series of hollow rim-sections each united at one end to one spoke and provided near its opposite end with a valved water-inlet, a series of paddles clamped between the meeting ends of adjacent rim-sections, and an outlet-pipe operatively connected with the wheel-shaft, substantially as described.

6. In a current-wheel, a series of hollow rim-sections each provided near one end with a valve-controlled water-ingress port and near its opposite end with a valved nipple, and a series of paddles clamped between the meeting ends of adjacent rim-sections, in combination with a tubular shaft, a series of hollow spokes united to said shaft and the valved nipples of the rim-sections, and a discharge-pipe operatively coupled with the wheel-shaft, substantially as described.

7. A current-wheel consisting of a suitable carrying-frame provided with journal-bearings, a tubular wheel-shaft having a hollow trunnion or journal, a series of hollow valved spokes communicating with said shaft, a se-

ries of hollow valved rim-sections communicating separately with the spokes, a series of paddles clamped between the rim-sections, a discharge-pipe supported on the frame, and a coupling united to said pipe and the tubular journal of said shaft, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

THEODORE JAMES VANCE.

Witnesses:

J. M. WILLIAMS,

FRANK C. ROBERTSON.