

(No Model.)

A. NIEDRINGHAUS.
WATER HOIST.

No. 413,627.

Patented Oct. 22, 1889.

Fig.1

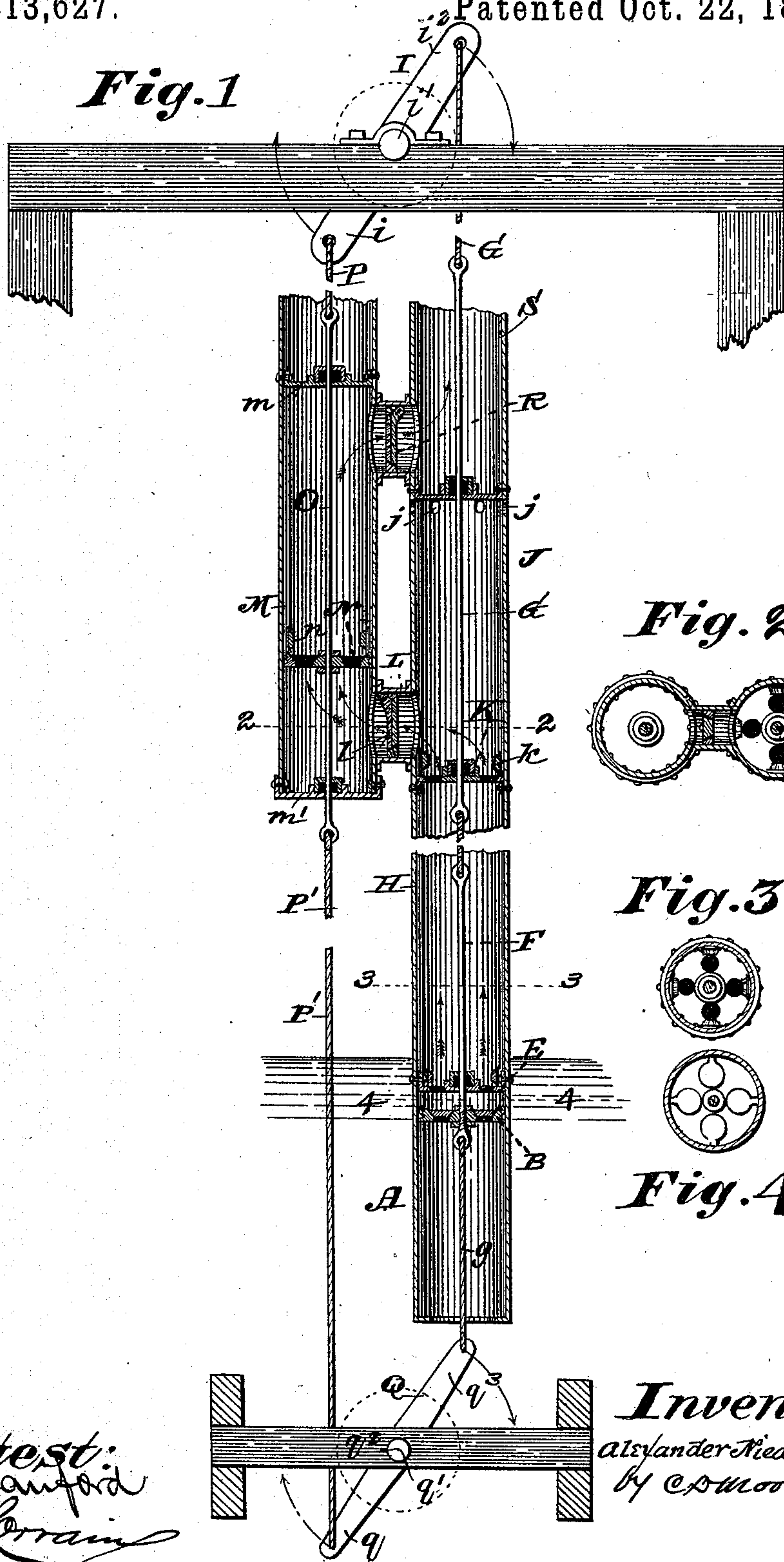


Fig. 2

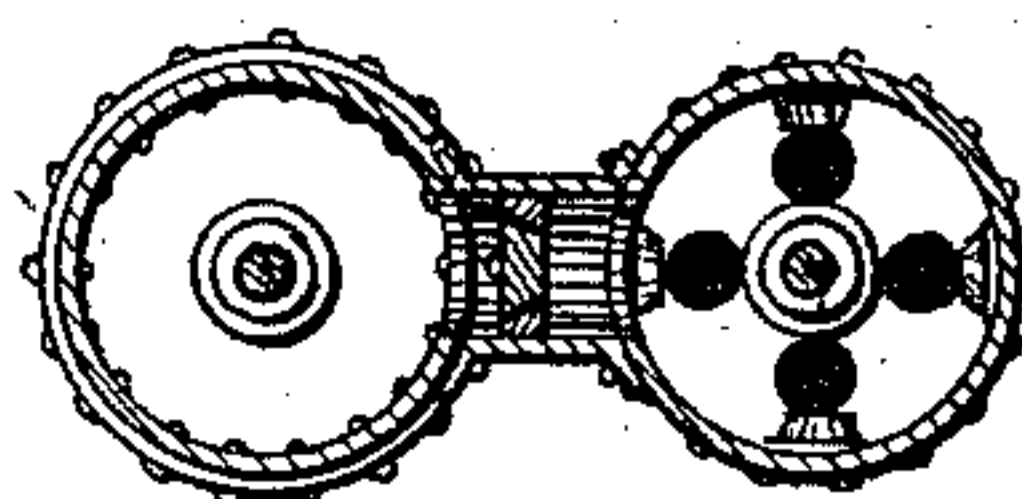


Fig. 3

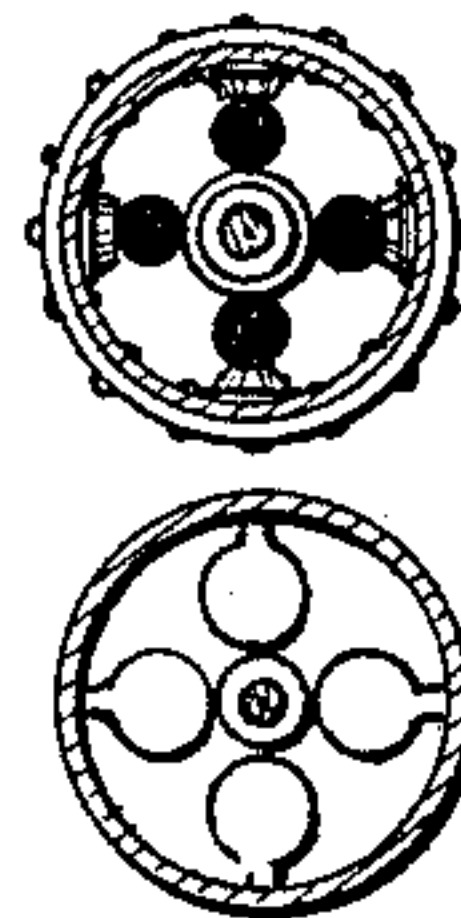


Fig. 4

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UNITED STATES PATENT OFFICE.

ALEXANDER NIEDRINGHAUS, OF ST. LOUIS, MISSOURI.

WATER-HOIST.

SPECIFICATION forming part of Letters Patent No. 413,627, dated October 22, 1889.

Application filed March 11, 1889. Serial No. 302,810. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER NIEDRINGHAUS, of St. Louis, Missouri, have made a new and useful Improvement in Water-Hoists, of which the following is a full, clear, and exact description.

The subject-matter of this improvement is closely related to a construction described in a pending application of mine for Letters Patent for an improvement in water-hoists, in that the elevation of the water is effected by means of a direct lift applied to a piston or plunger working in a cylinder submerged or partially submerged in the water to be elevated.

The improvement consists substantially as is hereinafter described and claimed, reference being had to the annexed drawings, making part of this specification, in which—

Figure 1 is a vertical section of the improved water-hoist; Fig. 2, a horizontal section on the line 2 2 of Fig. 1; Fig. 3, a horizontal section on the line 3 3 of Fig. 1; Fig. 4, a horizontal section on the line 4 4 of Fig. 1.

The same letters of reference denote the same parts.

A represents the cylinder; B, the piston working in the cylinder; E, the partition or head at the upper end of the cylinder; F, the piston-rod; G, the rope attached to the piston-rod; H, the tube attached to the cylinder and used to deliver the water from the cylinder, and I the lever for raising the rope, piston-rod, and piston, all substantially as shown in the drawings.

Water-hoists of the kind under consideration are oftener employed in raising water from deep places—such as mines—and I have ascertained that it is desirable to divide the lift into two lifts, and to so arrange them as to cause the weight of one of them to balance the weight of the other. To this end the tube H, Fig. 1, is extended upward but a part of the way to the level at which the water is ultimately discharged, and at its upper end the tube H is made to connect with a reservoir J, into which the water raised through the tube H flows.

A desirable arrangement of the reservoir is shown in Fig. 1, the reservoir being an extension of the tube H, substantially as shown in Fig. 1. The partition K, having the upward-

ly-opening valves *k*, serves to separate the tube H from the reservoir J. At *jj* are vents through which the air can pass out from and into the reservoir as the water is delivered into and withdrawn from the reservoir. By means of the passage L, having the check-valve *l* seating toward the reservoir, provision is made for delivering the water from the reservoir into a second cylinder M analogous to the cylinder A, and arranged at the level of the reservoir J, and having a piston N working upward and downward therein and attached to a rod O. The piston N has upwardly-opening valves *nn* therein, and the rod O extends upward through the upper cylinder-head *m*, and downward through the lower cylinder-head *m'*. A rope P serves to connect the rod O with the arm *i* of the lever I, and a rope P' connects the rod O with the arm *q* of a lever Q, which is pivoted at *q'* to any fixed bearing *q''* below the level of the hoist, and whose arm *q''* is connected with a rope *g*, which leads to the piston B in the cylinder A.

The operation is as follows: By turning the lever I upon its pivot *i'* to depress its arm *i* and to raise its arm *i''*, Fig. 1, the rope G is drawn upward and the piston B in consequence is lifted toward the upper end of the cylinder A. The connection *g* causes the arm *q''* of the lever Q to be raised and the arm *q* to be depressed. This movement of the lever Q causes the rope P', the rod O, the piston N, and the rope P to be drawn downward. As the piston B rises its valves seat, and as the piston N falls its valves unseat. The water above the piston B is lifted into the tube H and ultimately into the reservoir J, and as the water is thus lifted the valves in the head E and partition K unseat. The water finds its way from the reservoir J into the passage L, and thence past the valve *l* into the cylinder M, in which the piston N is falling as the piston B is rising. On turning the lever I in the opposite direction to depress its arm *i''* and raise its arm *i*, the parts P, O, N, and P' are drawn upward, the lever Q is turned upon its pivot to depress its arm *q''*, and the parts *g*, B, F, and G are, in consequence, drawn downward. The valves in the piston N are now seated, and the water above the piston is lifted and discharged from the cylinder M. The

water leaving the cylinder may pass into an independent tube and thence be discharged at the top of the hoist, or it may, as shown in Fig. 1, be delivered past a check-valve 5 R, which seats toward the cylinder M into a tube S, which rests upon the reservoir J, substantially as shown. The water after reaching the tube S is discharged at the top of the hoist. The lever I is then again re- 10 versed and the water raised in the cylinder A and delivered into the reservoir J, and so on with every vibration of the lever I lifting the water part of the distance to the top of the hoist.

15 The arrows in the drawings indicate the general course which the water takes in its upward movement, and they do not have any relation to the positions in which the valves are shown.

20 I claim—

The combination, with the lower cylinder

A, the tube H, vertically above the said cylinder and separated therefrom by the valve E, the reservoir-partition J, vertically above said tube and separated therefrom by the 25 valved partition K, the upper cylinder M, connected to the reservoir by the valved tube L above the partition K, and the tube S, vertically above the reservoir, separated therefrom by a partition, and communicating with 30 the cylinder M through a valved tube, of the two pistons, the double-armed pivoted levers, and the connections from the arms of said levers to the pistons and piston-rods, substantially as specified.

35 Witness my hand this 4th day of March, 1889.

ALEXANDER NIEDRINGHAUS.

Witnesses:

C. D. MOODY,

I. W. A. SANFORD.