W. E. HARRIS.
Mining-Pump.

No. 223,848. Patented Jan. 27, 1880.

Fig. 1.

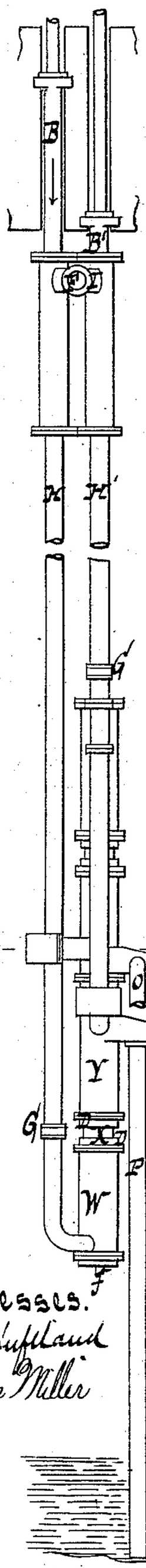

Fig. 2.

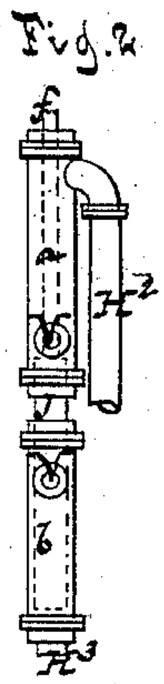

Fig. 3.

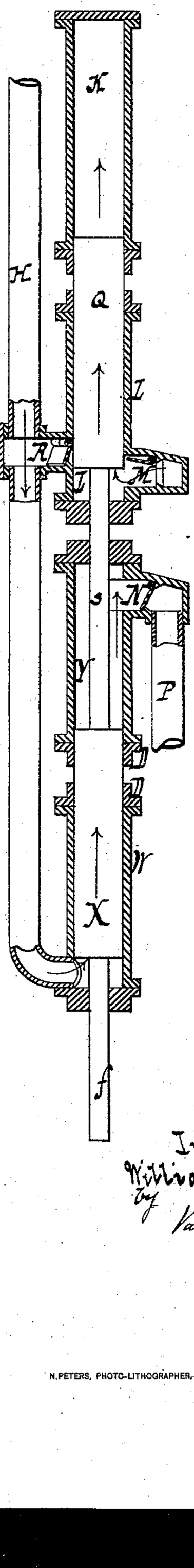

Fig. 4.

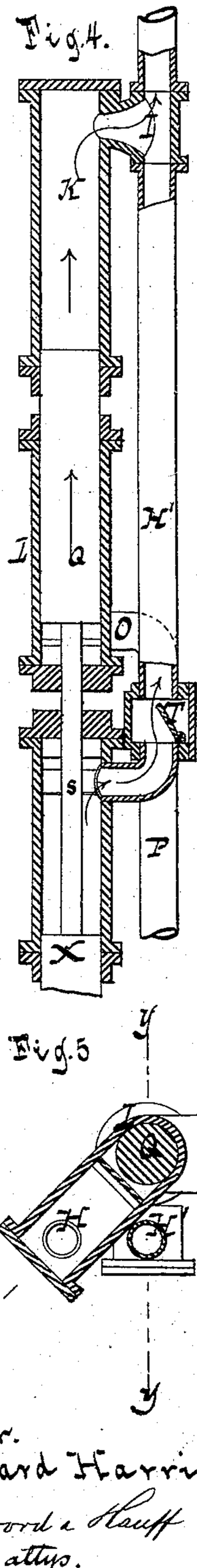

Fig. 5

Witnesses.
Otto Kupfland
William Miller

Inventor.
William Edward Harris
by Van Santvoord & Kauff
his attys.

UNITED STATES PATENT OFFICE.

WILLIAM E. HARRIS, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF OF HIS RIGHT TO FREDERICK J. HOYT, OF SAME PLACE.

MINING-PUMP.

SPECIFICATION forming part of Letters Patent No. 223,848, dated January 27, 1880.

Application filed April 29, 1879.

To all whom it may concern:

Be it known that I, WILLIAM E. HARRIS, of the city, county, and State of New York, have invented a new and useful Improvement in Pumps, which invention is fully described in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 is a front view of the pump, pressure-pipes, and plungers. Fig. 3 is a section in the plane *x x*, Fig. 5. Fig. 4 is a section in the plane *y y*, Fig. 5. Fig. 5 is a section in the plane *z z*, Fig. 1. Fig. 2 is a front view, on a smaller scale, of the plunger and cylinders for working the secondary pump.

Similar letters indicate corresponding parts.

This invention relates chiefly to that class of pumps called "mining-pumps;" and it consists in the combination of pressure-pipes, plungers working in said pressure-pipes, discharge-opening connecting with said pipes, pistons working in pressure-cylinders and acted on by the columns of water in said pressure-pipes, pressure-cylinders, suction-cylinders for receiving waste-water, and suction-pipes for conveying the waste-water into said suction-cylinders, all combined and operating as will be hereinafter described; also, in the combination, in a pump, of pressure-pipes, plungers working in said pressure-pipes, discharge-opening communicating with the same, pistons acted on by the columns of water in said pressure-pipes, pressure-cylinders, suction-cylinders, and suction-pipes, said suction-cylinders communicating with the pressure-pipes by suitable valves, so that the waste-water from these suction-cylinders is forced into the pressure-pipes and discharged, these pipes thus taking the place of rising mains, as will be hereinafter set forth; also, in the combination, in a pump, of pressure-pipes, plungers working in said pressure-pipes, discharge-opening communicating with the same, pistons acted on by the columns of water in said pressure-pipes, pressure-cylinders, suction-cylinders, and suction-pipes, said suction-cylinders communicating with the pressure-pipes by suitable valves, so that the waste-water from these suction-cylinders is forced into the pressure-pipes and discharged, whereby these pressure-pipes are kept constantly full, and unequal strain and injury to the mechanism are avoided; also, in a mining-pump constructed substantially as described, and provided with a connecting-rod for imparting motion to a secondary pump, so that by the same motive power several mines can be pumped out simultaneously; also, in a mining-pump constructed substantially as described, and provided with two pressure-pipes, so that the column of water in one pressure-pipe assists in raising the water in the other pressure-pipe, thus saving a large amount of motive power.

In the drawings, the letters H H′ designate two pressure-pipes which reach from the surface of the earth down into the mine. In these pressure-pipes work two plungers, B B′, alternately up and down. Motion is imparted to them by rods from any suitable motive power, as a steam-engine. E E are guides for keeping the plunger in a right line. D D are stuffing-boxes, through which the plungers pass. These pressure-pipes H H′ are full of water, and when the plunger B descends in the direction of the arrow it forces the water down through this pipe H and causes it to press on the lower end of the piston X, working in the cylinder W, forcing it up. This piston X passes through stuffing-boxes D D up into the suction-cylinder Y, and when it is pressed up it forces the water in said cylinder Y through the valve T up into the other pressure-pipe, H′. This piston X is further connected, by a rod, *s*, to the piston Q, working in the suction-cylinder L and pressure-cylinder K, and when the piston X is forced up it also forces up said piston Q. By this means the water in the top of the cylinder K is forced out through the T-connection I and up into the pressure-pipe H′. This action continues till the plunger B is at its lowest point and the piston B′ is at its highest, when part of the water flows out at the discharge-opening F, because of the plunger B rising above said discharge-opening. The piston Q, while being pushed up, also leaves a partial vacuum below it in the suction-cylinder L, whereby the valve M is opened and water flows in through the suction-pipe O, which reaches into the water into the mine to be pumped out.

When the plunger B′ begins to descend the

water in the pressure-pipe H′ is forced down, and, closing the valve T, presses through the T-connection I on the top of the piston Q, forcing it down, together with the piston X.

The water in the suction-cylinder L is acted on by the lower end of this piston Q, whereby the valve M is closed, the valve R is opened, and the water forced into the pressure-pipe H. The water in the cylinder W is also forced out into this pipe H by the descent of the piston X. This action continues until the plunger B has reached its highest point, when some of the water flows out through the discharge-opening F. This discharge-opening F connects with both pipes H and H′; but, if desired, a separate discharge can be provided for each pipe H and H′. The descent of this piston X in the cylinder Y produces a partial vacuum therein, which causes the valve N to open and water to flow in through the suction-pipe P, which pipe passes into the waste-water in the mine, the same as the pipe O.

It will be seen that the pressure-pipes H H′, which serve to impart motion to the pistons X Q, also receive the waste-water from the suction-cylinders Y L and discharge the same at F. The advantage of this arrangement is that the pressure-pipes H H′ are always kept full.

In other machines the pressure-pipes are merely used to impart motion to the pistons, while the waste-water is discharged through one or more rising mains. In these machines it often happens that by evaporation or leakage the quantity of water in one pressure-cylinder becomes smaller than in the other. Unequal strain is thus thrown on different parts of the machinery. By my invention this inconvenience is entirely overcome.

If it is desired to repair the pump, the water in the pressure-pipes H H′ is prevented from flowing out by closing the stop-cocks G G. To the piston X is attached a rod, *f*, which imparts motion to a piston, J, working in cylinders *a b*. With these cylinders *a b* connect pipes H″ H‴, which are the exact counterparts of the pipes H and H′, and connect with a pump in a mine situated farther down. This secondary pump is constructed like the pump shown in Fig. 1, and the waste-water which discharges through these pipes H″ H‴ flows through the openings V V into a tank or other suitable receptacle situated in the same mine as the pump shown in Fig. 1. From here the water is pumped by said pump (shown in Fig. 1) up to the surface of the earth, and there discharged through opening F.

By this means several mines or several galleries of a mine which are at different levels can be pumped out simultaneously.

I am aware of English Patent No. 2,228 of 1863, and I hereby disclaim the construction and arrangement therein shown, as such are not my invention.

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

1. The combination, in a mining-pump, of two parallel pressure-pipes, H H′, two alternately-operating plungers, B B′, working respectively in said pressure-pipes, a discharge-pipe, F, connecting with the said pressure-pipes, a lower and upper pressure-cylinder, W and K, with which the pressure-pipes communicate, intermediate lower and upper suction-cylinders, Y and L, vertically-arranged pistons X and Q, connected together and arranged respectively in the lower and upper pressure-cylinders, and actuated by the columns of water in the pressure-pipes, all constructed and arranged for operation as herein shown and described.

2. The combination, in a pump, of two pressure-pipes, H H′, two plungers, B B′, discharge-opening F, (one or more,) communicating with said pipes H H′, vertically-arranged pistons X and Q, acted on by the column of water in said pressure-pipes, lower and upper pressure-cylinders, W and K, intermediate upper and lower suction-cylinders, Y and L, and suction-pipes O and P, communicating, respectively, with the upper and lower suction-cylinders, said suction-cylinders Y and L communicating with the pressure-pipes H H′ by suitable valves R and T, so that the waste-water from these suction-cylinders is forced into the pressure-pipes and discharged, these pipes thus taking the place of rising mains, substantially as set forth.

3. The combination, in a pump, of two pressure-pipes, H H′, two plungers, B B′, discharge-opening F, (one or more,) vertically-arranged pistons X and Q, lower and upper pressure-cylinders, W and K, intermediate lower and upper suction-cylinders, Y and L, and suction-pipes O and P, communicating, respectively, with the lower and upper suction-cylinders, said suction-cylinders communicating with the pressure-pipes by suitable valves R and T, so that the waste-water from these suction-cylinders is forced into the pressure-pipes H H′ and discharged, whereby these pressure-pipes are kept constantly full and unequal strain and injury to the mechanism are avoided, substantially as described.

WILLIAM EDWARD HARRIS.

Witnesses:
OTTO BRADA,
GEO. W. CARR.