No. 621,667. Patented Mar. 21, 1899.

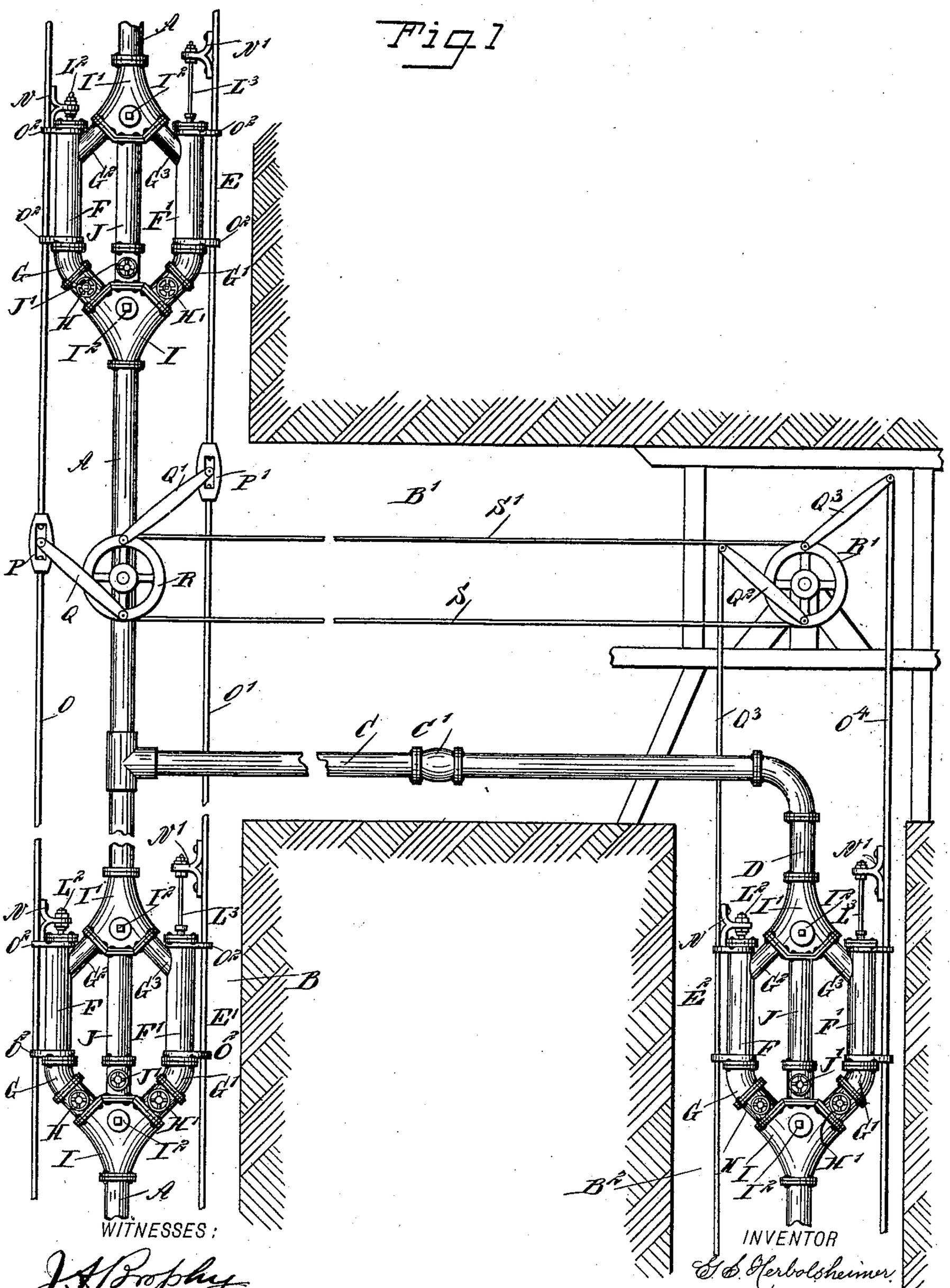
G. S. HERBOLSHEIMER.

DEEP MINE OR RELAY PUMP.

(Application filed July 11, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig 1



WITNESSES:

J. A. Brophy.

Geo. J. Hoskins.

INVENTOR

G. S. Herbolsheimer.

BY Munn & Co.

ATTORNEYS.

No. 621,667. Patented Mar. 21, 1899.

G. S. HERBOLSHEIMER.

DEEP MINE OR RELAY PUMP.

(Application filed July 11, 1898.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 4

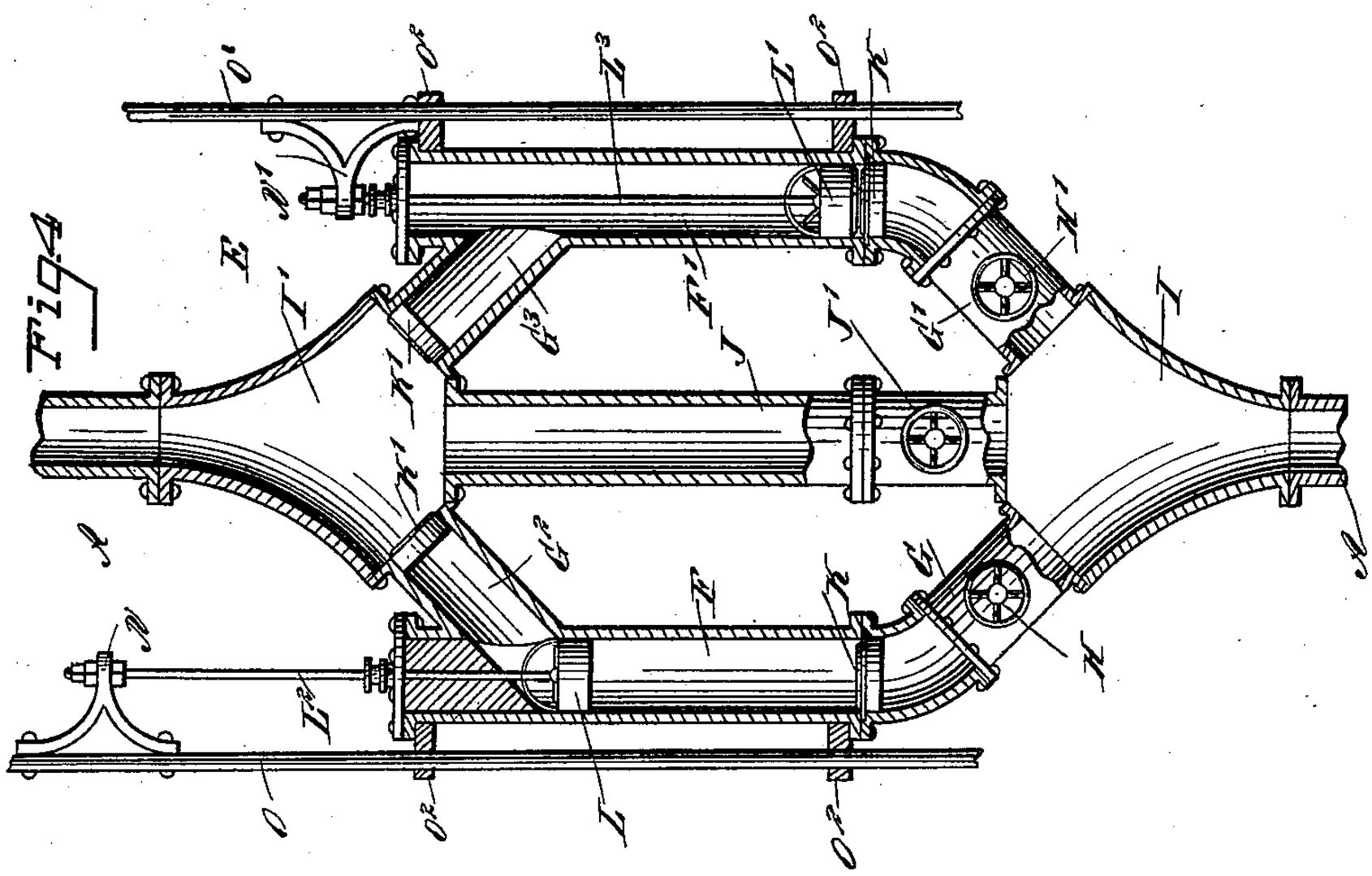


Fig. 2

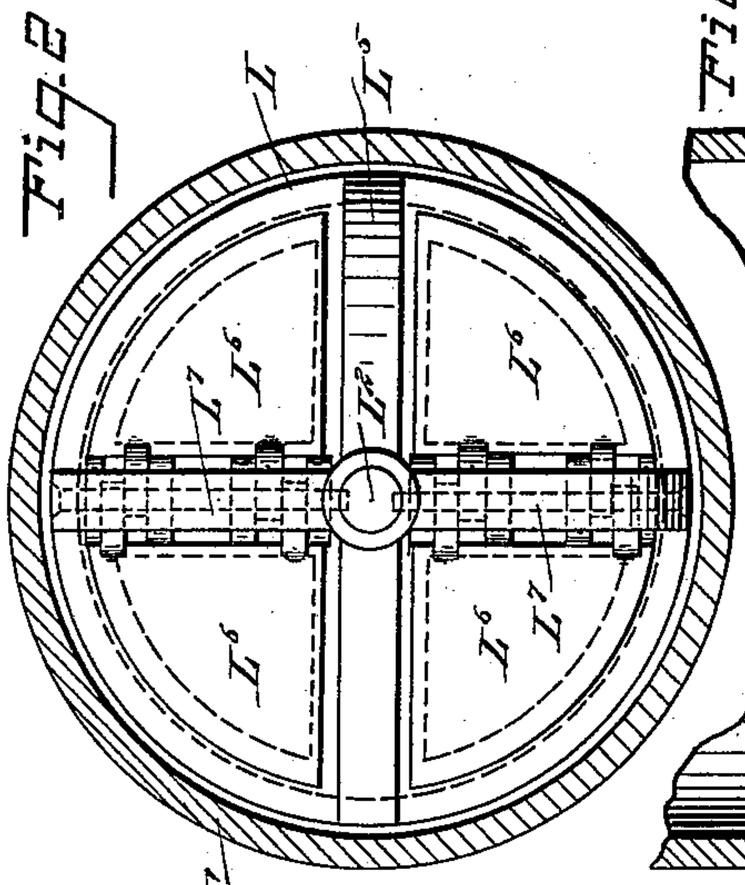
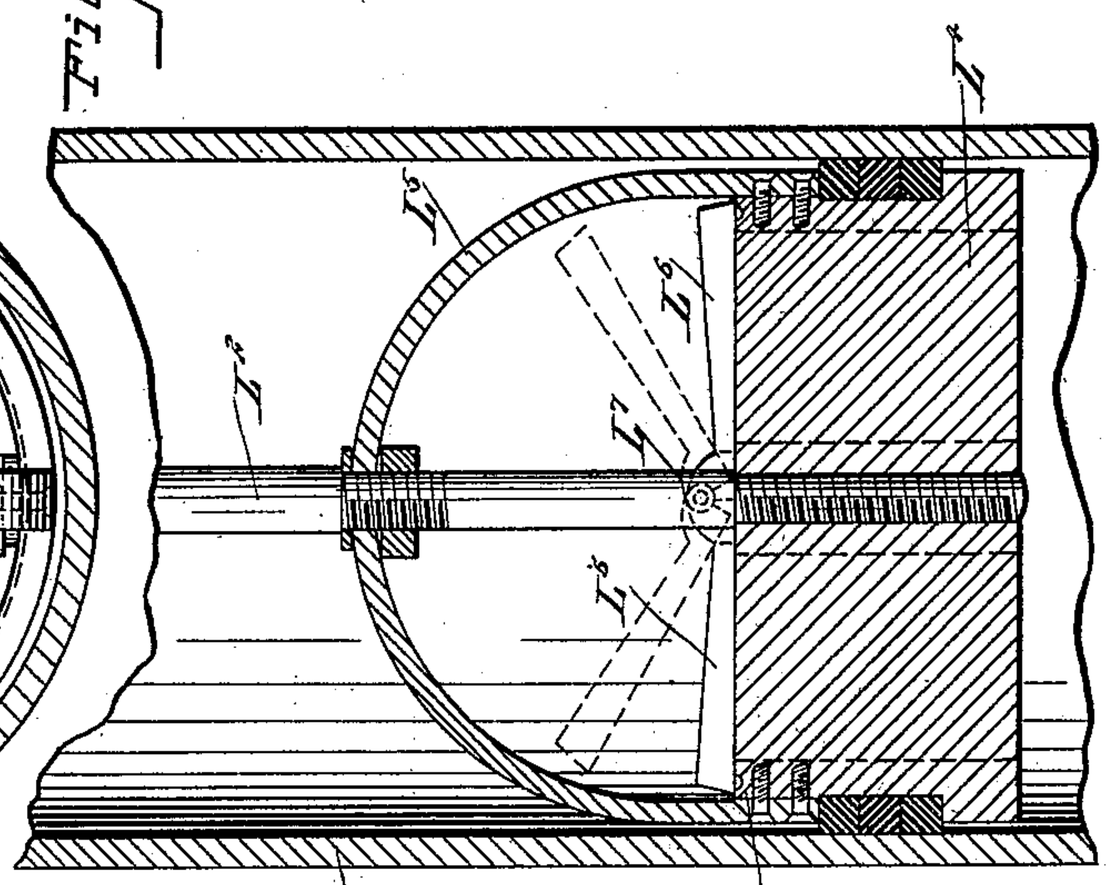


Fig. 3



WITNESSES:

J. A. Brophy

Rud. J. Hoosteny

INVENTOR

G. S. Herbolsheimer.

BY Munn & Co.

ATTORNEYS.

UNITED STATES PATENT OFFICE.

GEORGE S. HERBOLSHEIMER, OF DENVER, COLORADO.

DEEP-MINE OR RELAY PUMP.

SPECIFICATION forming part of Letters Patent No. 621,667, dated March 21, 1899.

Application filed July 11, 1898. Serial No. 685,671. (No model.)

To all whom it may concern:

Be it known that I, GEORGE S. HERBOLSHEIMER, of Denver, in the county of Arapahoe and State of Colorado, have invented a new and Improved Deep-Mine or Relay Pump, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved deep-mine or relay pump arranged to permit of pumping water out of a mine-shaft at one or more levels at the same time, the pump being arranged to allow the operator to connect or disconnect any one of the individual pumps whenever desired.

The invention consists of novel features and parts and combinations of the same, as will be fully described hereinafter and then pointed out in the claim.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of the improvement as applied and with the mine in section. Fig. 2 is an enlarged sectional plan view of one of the pump-cylinders and a plunger operating therein. Fig. 3 is a sectional side elevation of the same, and Fig. 4 is an enlarged sectional side elevation of the duplex pumps.

The improved device for raising water from mine-shafts and levels is provided with a main pipe A, extending in the mine-shaft B and connected with a branch pipe C, containing a check-valve C′, said branch pipe extending through a level B′, terminating in a sump B^2. The branch pipe C connects with a pipe D, extending in the sump B^2, and said main pipe A, as well as the pipe D, is provided with double or duplex single-action pumps E E′ E^2, respectively, it being understood that the connection of the pipe C with the main pipe A is between the two pumps E E′. The several pumps E E′ E^2 are alike in construction and it suffices to describe but one in detail, special reference being had to Figs. 2, 3, and 4.

Each of the pumps is provided with two cylinders F F′, connected at their lower ends by pipes G G′, respectively, with a chamber I, connected with the pipe A, and similar pipes G^2 G^3 lead from the upper ends of the cylinders F F′ to a discharge-chamber I′. A pipe J connects the two chambers I I′ with each other, so as to render the pipe A continuous. In the pipe J is a valve J′, which is normally closed, while the valves H H′ in the pipes G G′ are normally open; but when it is desired to cut out the cylinders F F′ then the valves H H′ are closed and the valve J′ is opened, so that water can pass directly through the chambers I I′ and pipe J and the pipe A. The chambers I I′ are provided with suitable plugs I^2 for giving access to adjacent valves.

In the lower end of the cylinders F F′ are arranged check-valves K, and similar check-valves K′ are arranged on the upper ends of the pipes G^2 G^3. In the cylinders are mounted to reciprocate plungers L L′, respectively held on plunger-rods L^2 L^3, extending upwardly through stuffing-boxes secured to the upper ends of the cylinders. The outer ends of the plunger-rods L^2 L^3 are secured to brackets N N′, respectively, bolted or otherwise fastened to rods O O′, extending throughout the length of the shaft B and guided in suitable bearings O^2, attached to the cylinders. The upper ends of the rods O O′ are connected with a suitable mechanism — such as a pump, for instance—for imparting a reciprocating motion to the said rods simultaneously, but in opposite directions thereto, to cause one of the plungers to ascend while the other descends to make the pump a duplex single-action pump.

In order to transmit the motion of the side rods O^3 O^4 for working the plungers of the pumps E^2 in the sump B^2, I provide the following device: On the rods O O′ are arranged turnbuckles P P′, respectively, pivotally connected by pitmen Q Q′ with diametrically opposite wrist-pins on a crank-wheel R, journaled on a suitable stud carried by the pipe A, and said crank-wheel R is connected at its wrist-pins by links S S′ with similar wrist-pins on a crank-wheel R′, arranged in the level B′ over the sump B^2. This wheel R′ has its wrist-pins connected by pitmen Q^2 Q^3 with the rods O^3 O^4, previously mentioned, so that the up-and-down motion given to the rods O O′ is transmitted by the pitmen Q Q′, the wheel R, the links S S′, the wheel R′, and the pitmen Q^2 Q^3 to the rods O^3 O^4 to actuate the plungers in the pumps E^2.

It is evident from the foregoing that when

the several valves J′ are closed and the valves H H′ are opened in all of the pumps and a reciprocating motion is given to the rods O O′, as previously explained, then all the pumps are set in motion simultaneously and water is pumped from the mine-shaft, as well as from the level and its sump, to the outside of the mine. By opening the valve J′ and closing the valves H H′ of any one of the pumps the operator is enabled to cut out a level or main shaft, as desired, so that water is only pumped from the main shaft or from one of the levels, as desired.

It will be seen that a pump constructed in the manner described may be used for shallow-well pumping and give excellent satisfaction on account of the large amount of water raised by the pump with the greatest ease. Any one of the pumps can be readily arranged for any kind of work, and the pumps are not expensive to build or keep in repair and will pump any amount of water with any kind of power. When used in a mine, they take up very little space, cannot be flooded, will not overheat a mine, and can be placed at any angle and repaired without stopping the entire system.

In order to assure long life to each plunger in a pump, I prefer to construct the same as shown in detail in Figs. 2 and 3—that is, I provide the cylindrical plunger-body L^4 with a spider, in the middle of which screws the lower end of the plunger-rod L^2, and on the said body is secured a bail L^5, engaged by the rod L^2, as is plainly shown in Fig. 3. The valves L^6 are hung on pintles L^7, carried in eyes formed on the body L^4 and engaging the lower end of the plunger-rod L^2, so as to hold the several parts securely in position. The valve-seats for the valves L^6 are formed with grooves L^8, adapted to contain water to cushion the valve and obviate the necessity of providing a special packing for the valves.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

A deep-mine or relay pump comprising a series of pumps arranged in successive pairs at different elevations, a common water-main, each pair of pumps comprising two cylinders having suction and discharge connection with the water-main, a cut-off valve in each suction connection, a by-pass for the main pipe having a cut-off valve therein, a piston in each cylinder having a rod extending through a stuffing-box in the upper end of the cylinder, two power-transmitting rods extending alongside of the corresponding cylinder of each set, connections from said rods to the piston-rods, and means for giving the power-transmitting rods alternate or opposite reciprocations, substantially as described.

GEORGE S. HERBOLSHEIMER.

Witnesses:
H. ZIMMERMAN,
JNO. E. LOWE.