No. 759,100. PATENTED MAY 3, 1904.

W. B. HARRIS.

AIR OR GAS LIFT FOR FLUIDS.

APPLICATION FILED JULY 6, 1903.

NO MODEL.

Fig 1

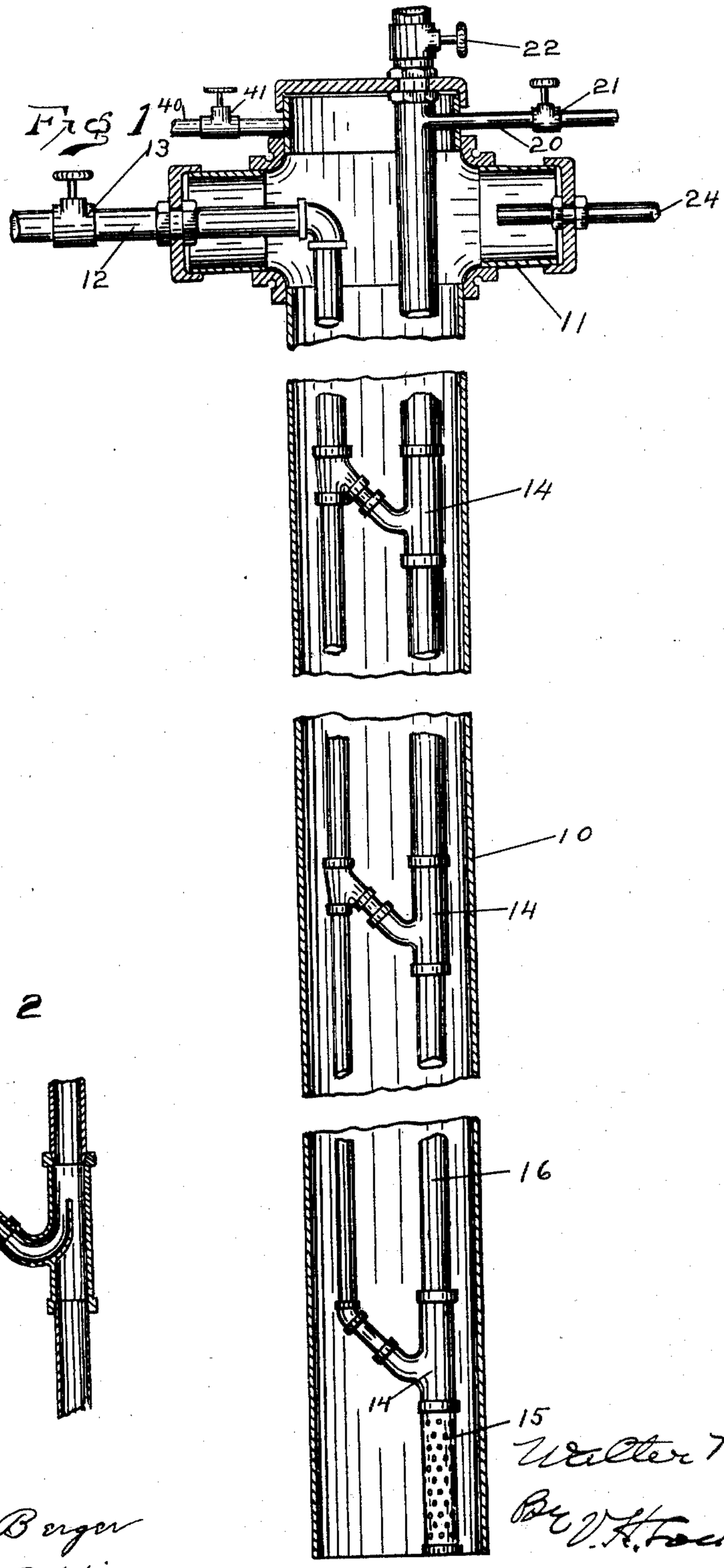
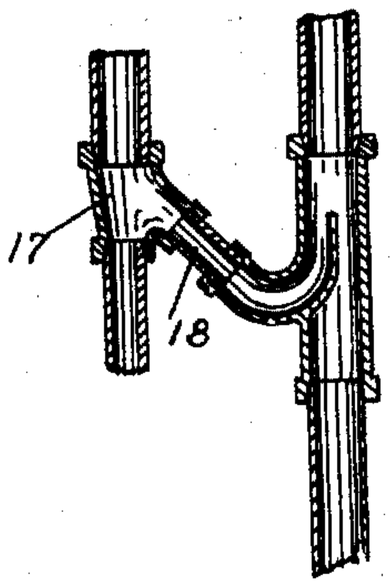


Fig 2



Witnesses
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No. 759,100. Patented May 3, 1904.

UNITED STATES PATENT OFFICE.

WALTER B. HARRIS, OF INDIANAPOLIS, INDIANA.

AIR OR GAS LIFT FOR FLUIDS.

SPECIFICATION forming part of Letters Patent No. 759,100, dated May 3, 1904.

Application filed July 6, 1903. Serial No. 164,359. (No model.)

To all whom it may concern:

Be it known that I, WALTER B. HARRIS, of Indianapolis, county of Marion, and State of Indiana, have invented a certain new and useful Air or Gas Lift for Fluids; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which like numerals refer to like parts.

The object of this invention is to provide an effective, convenient, and simple means for pumping fluid from deep wells by compressed air or gas.

The chief feature of this invention consists in combining with the casing a single delivery-tube extending from the bottom of the well and a pipe for conveying compressed air or gas through ejectors connected with the delivery-tube at intervals, so that the fluid will be lifted successively from one ejector to another until discharged at the mouth of the delivery-pipe.

The foregoing is combined with means for introducing compressed air within the casing and upon the body of fluid.

Another feature of this invention is means for clearing the pipes, and especially the strainer, when clogged, by shutting off the compressed air or gas into the air or gas inlet pipe and turning the compressed air or gas into the delivery-pipe. This will blow any obstructions out of the strainer or clear any obstruction elsewhere, as there are no valves or other delicate mechanism to be affected.

The full nature of this invention will be understood from the accompanying drawings and the following description and claims.

In the drawings, Figure 1 is a central vertical section of the pump. Fig. 2 is a central vertical section of a portion of the air or gas inlet pipe, of a delivery-pipe, and of the ejector connection between them.

I show herein a casing 10, with a head 11 secured thereon so as to be air-tight. 12 is an inlet-pipe for compressed air or gas furnished from any suitable source. It is provided with a valve 13 and extends to the bottom of the well, where it is provided with an ejector 14. This ejector has secured at its intake end a strainer 15, and a delivery-tube 16 leads from the outlet end of the ejector to the mouth of the well. At intervals, say, of five hundred feet I place other ejectors 14 in the delivery-tube that are connected with the air or gas inlet pipe. The air or gas inlet tube 12 and also the delivery-tube 14 are preferably decreased in diameter from ejector to ejector as they proceed downward, so that only a portion of the compressed air or gas entering the tube 12 will go through the first ejector and only a portion of the remainder through the second ejector, leaving a portion to go through the subsequent ejectors. The delivery-tube preferably increases in diameter from ejector to ejector in order to receive and discharge the volume of fluid and air, which increases with each ejector.

The operation of the pump is as follows: Air or gas under pressure, say, of forty-five pounds is introduced into the pipe 12 and passes down through said pipe and through the various ejectors 14 connected therewith, by which it is turned backward and upward into the delivery-tube. This creates a suction which draws the fluid adjacent the strainer 15 through the lower ejector and then successively through the sections of the delivery-tube and ejectors above. Therefore the fluid is successively lifted from level to level by the compressed air or gas, so that the volume of compressed air or gas passing through any one ejector will not have to lift the fluid the whole distance, but only a portion of the distance—say five hundred feet; yet the air or gas entering the various upper ejectors coöperates to create a suction acting through the lower ejectors.

Still another feature of the invention consists in means for clearing the passage-ways and pipes in the pump, if they become clogged, by reversing the current of the compressed air or gas and blowing it through the delivery-tube instead of through the air or gas inlet pipe. This clearing operation is as follows: By closing the valve 13 in the air or gas inlet tube 12 and closing the valve 22 in the delivery-pipe 16 and opening the valve 21 in the pipe 20, which might be termed the "blow-out" pipe and which may be supplied with compressed air or gas from any suitable source, the air may be blown down through

the delivery-pipe 16, clearing the ejector 14 and the strainer 15 from any foreign matter which may have collected therein. By closing the valve 21 and opening the valves 22 and 13 the pump may be again put in service.

24 is a pipe through which compressed air or gas may be introduced into the casing for forcing the body of fluid down through the casing and upward into the strainer or tube, coöperating with the means heretofore described for elevating the water and discharging it. A blow-off pipe 40 is provided at the upper end of the casing with a valve 41, so as to relieve the pressure within the casing if it becomes excessive.

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

1. An air or gas lift for fluids including an air-tight casing, a delivery-tube extending downward in the casing with an inlet at its lower end, a pipe within the casing extending parallel with said delivery-tube through which compressed air or gas may be conveyed, ejectors leading at intervals from said air or gas pipe to said delivery-tube, and means for introducing compressed air into the casing upon the body of fluid.

2. An air or gas lift for fluids including a delivery-tube, means for supplying compressed air or gas to said delivery-tube below its upper end for forcing the fluid out through said tube, a pipe for conveying compressed air or gas to the upper portion of said delivery-tube, and valves in said pipes and tube for opening or closing the same so that compressed air or gas may be forced backward through the delivery-tube for cleaning the pump.

In witness whereof I have hereunto affixed my signature in the presence of the witnesses herein named.

WALTER B. HARRIS.

Witnesses:
JACOB F. MARKS,
JUDSON J. SHULTZ.