S. ARNDT & W. S. AYERS.

Pump.

No. 164,631. Patented June 22, 1875.

Fig. 2.

Fig. 1.

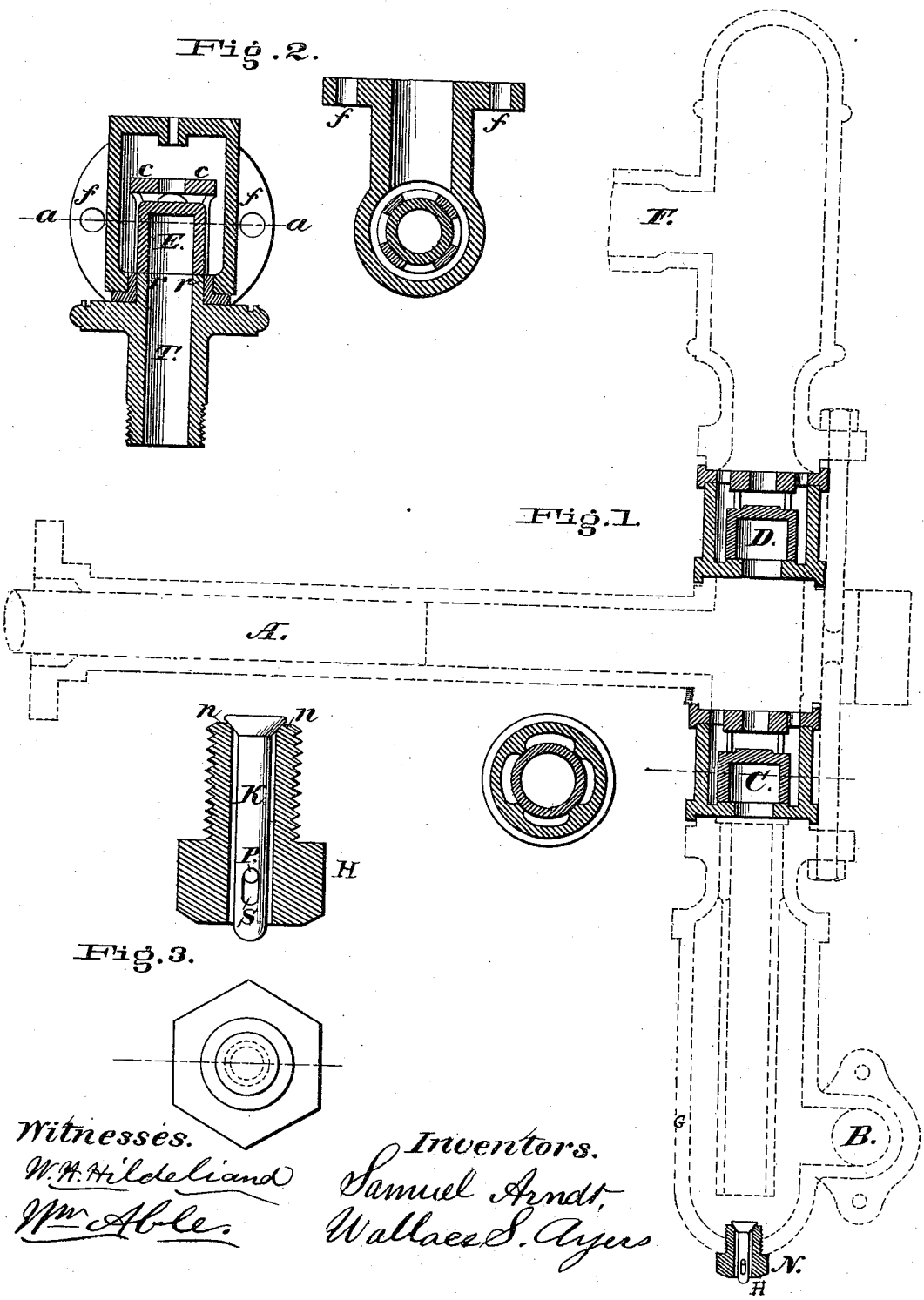

Fig. 3.

Witnesses.

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UNITED STATES PATENT OFFICE.

SAMUEL ARNDT AND WALLACE S. AYRES, OF EASTON, PENNSYLVANIA.

IMPROVEMENT IN PUMPS.

Specification forming part of Letters Patent No. **164,631**, dated June 22, 1875; application filed May 20, 1873.

To all whom it may concern:

Be it known that we, SAMUEL ARNDT and WALLACE S. AYRES, both of Easton, in the county of Northampton and State of Pennsylvania, have invented certain Improvements in Pumps, of which the following is a specification:

Our invention relates to that class of pumps used in giving motion to fluids whose valves are closed by the return action of the fluid drawn or forced through them.

The object of our invention is to prevent the destructive effects of non-elastic fluids to the pump by the introduction of air into the fluid in the most simple, effective, and practicable manner.

To give a more clear and definite idea of our invention, its action, and application than could be given in a general way, we will confine the description to the feed-water pumps of locomotives.

In the drawing, Figure 1 represents a sectional view of a feed-water pump. A is the plunger and pump-barrel; B, the supply-pipe leading from the water-tank; C and D, the induction and ejection valves; F, the ejection-pipe leading to the boiler; G, the supply-chamber. Fig. 2 represents a vertical section of the check-valve, together with a horizontal section of the same through *a a*, looking upward. This valve is connected with the ejection-pipe of the pump by the neck T, is fastened to the boiler by the flange *f f*, and prevents the water forced into the boiler from returning. E is the valve proper, resting upon its seat *r r*. *c c* is the valve-cage, which governs the lift of the valve, and guides it in its motion. These valves C, D, and E have been a source of annoyance both to engineer and machinist, on account of the noise in closing and their constant wear. This annoyance, together with the leaking of joints from excessive strains, has, to a certain extent, been prevented by the introduction of air into the valve-box of the pump. We propose to introduce the air, not into the valve-box, but into the supply-pipe or chamber through the air-valve N, which we have termed "The Pneumatic," and which we claim is of our own invention. Fig. 3 represents a section and plan of "The Pneumatic." It consists of any ordinary tap-plug, as H, drilled through the center, with the inner end reamed out, forming the valve-seat *n n*. The valve K is ground to its seat, and has a stem fitting loosely in the plug and long enough to pass through it, with a slot, S, cut in the stem, longer than the necessary lift of the valve, to allow for the thickness of the pin P. Through this slot S, and through the plug, is passed the pin P. This pin prevents the valve being drawn from its place, and adjusts the lift. This air-valve N, Fig. 1, must always be placed in a vertical position, opening inward and upward, and always on the receiving side of the induction-valve, substantially as shown in the drawing. Now, when the plunger A draws the water into the pump-barrel, it also draws in a small quantity of air through the air-valve N. This air, in passing into the supply at this point, meets the stream of water where it is in the greatest state of agitation, owing to the sudden change of direction which it here makes, and is at once divided into smaller bubbles. On passing the induction-valve of the pump, the bubbles are subdivided into very minute ones, and are thoroughly mixed with the water, making it quite elastic. An air-chamber has been found to be of service in relieving the shocks and strains in the machinery of the pump, incident to the non-elasticity of the water, and air introduced into the water at the valve-box proves to be a better remedy; but, to introduce the air at the point which we have designated, we are assured accomplishes the desired end in every way, with these virtues, which we claim, viz:

The mechanism used to introduce the air is very simple, and hence not liable to disorder. The amount of air introduced, being divided into very minute bubbles, and thoroughly mixed with the water, is a minimum in quantity—hence at the least sacrifice of the working capacity of the pump.

By introducing the air into the supply on the receiving side of the induction-valve, the supply-pipe or chamber, together with the induction-valve, is relieved from all destructive shocks and strains.

By combining the air-valve with a tap-plug, it can be removed for repairs at any time, and a similar or solid plug screwed into its place

until repairs are completed, thus allowing the pump to continue working. Also, by combining the air-valve with a tap-plug, and adjusting the lift by means of the slot S and pin P, or its equivalent, the valve is shielded from any alteration by external agencies.

The invention above described can be applied to the feed-water pumps of stationary and marine engines; also to any engine, pump, or machine laboring under difficulties like those above mentioned.

Having described our invention, its action, and application, what we claim therein as new and of our own invention, and desire to secure by Letters Patent, is—

1. The combination, with the supply-pipe or chamber of feed-water and force-pumps, of an air-passage or an air-valve on the receiving side of the induction-valve, substantially as and for the purposes set forth.

2. The combination, with a tap-plug, of an air-passage or an air-valve, as K, Fig. 3, substantially as and for the purposes set forth.

3. The combination, with a tap-plug and the air-valve K, of the slot S and pin P, substantially as and for the purposes set forth.

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Witnesses:
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