E. G. WHEELER.

Pump for Compressing Ammoniacal and other Gases.

No. 221,008. Patented Oct. 28, 1879.

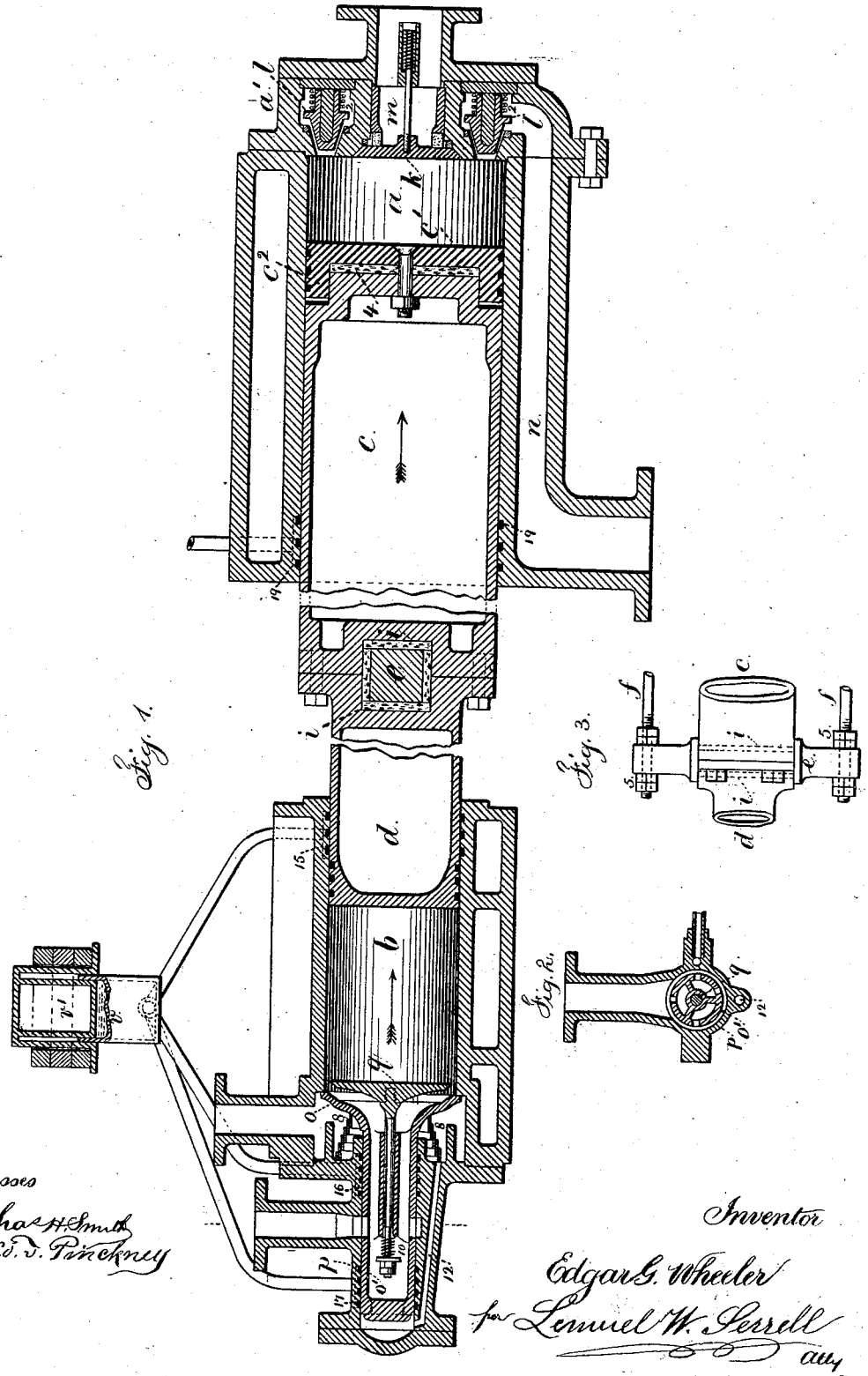

Fig. 1.

Fig. 3.

Fig. 2.

Witnesses

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EDGAR G. WHEELER, OF NEW YORK, N. Y.

IMPROVEMENT IN PUMPS FOR COMPRESSING AMMONIACAL AND OTHER GASES.

Specification forming part of Letters Patent No. **221,008**, dated October 28, 1879; application filed October 11, 1878.

To all whom it may concern:

Be it known that I, EDGAR GAYLORD WHEELER, of the city and State of New York, have invented an Improvement in Pumps for Compressing Ammoniacal and other Gases or Exhausting or Compressing Air, of which the following is a specification.

I make use of two plungers connected together and operated by connecting-rods and a cross-head to the crank-shaft of an engine.

There is an elastic material, such as india-rubber, that prevents injury to the parts in case the plunger comes against the head of the cylinder, the object being to insure the nearest possible contact of the plunger with the cylinder-head, so as to compress the ammoniacal gases.

I also make use of a compound yielding valve in the cylinder-head, to admit the gas or air that is exhausted, and to allow of the escape of the compressed gases.

In the drawings, Figure 1 is a horizontal section of the pump complete. Fig. 2 is a cross-section of the valve-stem and its cylinder, and Fig. 3 is a detail.

The cylinders *a* and *b* are axially in line, and contain the rams or plungers *c d*, which are connected together by bolts. A mortise passes through these rams where they are united, and in said mortise there is a cross-head, *e*, with connecting-rods *f f* (see Fig. 3) at each end, passing to cranks upon a shaft that is revolved by suitable power, such as a steam-engine.

Between the cross-head *e* and the rams there are blocks of yielding material, such as india-rubber, at *i i*, the same being compressed by the bolts that hold the rams together. This india-rubber will yield in case the end of the ram comes into contact with the interior of the cylinder-head *a'*, thereby avoiding injury to the parts.

The induction-valve *k* to this cylinder *a* is preferably placed in the middle of the cylinder-head *a'*, and it is closed by a spring.

The exit-valves *l l* are also in the head *a'*, and open outwardly, and are closed by the springs 2 2, said valves being conical and closing upon their seats, with the smaller ends of the valves flush, or nearly so, with the inner surface of the head.

The inlet ports or pipes *m* and exit ports or pipes *n* are of usual character; and I find it preferable in some instances to make the end of the ram *c* as a cap, *c'*, with a rim, c^2, bolted to the ram *c*, and provided with blocks of india-rubber 4 or similar elastic material, to allow the end of the ram to yield in case of contact with the head *a'*.

The nuts 5 on the connecting-rods allow for adjusting the position of the ram to the cylinder; but as variations in temperature may derange the adjustment, and it is necessary that the ram come up and just touch the head, I have introduced the yielding material at *i* and 4 to avoid accident.

The cylinder *b* and ram *d* are constructed similarly to the cylinder *a* and ram *c*, so far as the packing of the ram in the cylinder, hereinafter described; but the cylinder *b* and ram *d* are shown as of smaller diameter than the cylinder *a*. The end of the cylinder *b* forms a seat for a valve, *o*, upon a tubular stem, *o'*, sliding in the cylinder *p*, and forced toward the seat by the spring 8. This valve forms the eduction, and it yields and opens to the pressure of the gases, and also to the pressure of the end of the ram in cases where said ram comes into contact with the valve as it approaches the end of the stroke. On the return movement of the ram the valve moves with the same until its edge rests upon its seat, and then the induction-valve *q* is opened by the gases as they rush into the vacuum formed by the retiring plunger. When the plunger commences to move toward the valve *q* its spring 10 closes the same, and the gases are expelled past the valve *o*, as before.

The passage-way 12, connecting from the eduction-chamber containing the valve *o* to the space behind the tubular valve-stem *o'*, produces an equalization of the pressure, and allows the valves to move without hinderance by any unbalanced pressure.

At 15, around the inside of the cylinder *b*, and at 16 and 17 in the surface of the cylinder *p*, around the tubular valve-stem, there are packing-grooves to render the parts air-tight. These grooves may be filled with suitable material, such as steel or leather rings or other packing material. I, however, prefer and use thick heavy oil, tallow, glycerine, or glycerine and finely-pulverized plumbago or

similar material, the same being supplied into these grooves from a reservoir or vessel, *v*, under pressure from a ram or plunger, *v'*, the vessel *v* being connected to the annular grooves in the cylinders by pipes and cross-channels from one groove to the other. The pressure is sufficient to keep a constant supply of the lubricating material in the grooves and effectually prevent leakage, and there will be but little waste of such semi-liquid material when the parts are properly constructed. The packing-grooves 19 in the cylinder *a* are similarly constructed, and are supplied with lubricating material under pressure. The cylinders *a b* should be surrounded with a water-jacket, as usual, for cooling the same.

I am aware that grooves have been used in the surfaces of pistons, and at the gland of the cylinder-head where the piston-rod slides through such head, and also that lubricating material has been supplied into the grooves in a valve or the seat thereof.

I claim as my invention—

1. The combination, with the two plungers *c* and *d* in the cylinders *a* and *b*, of the cross-head *e*, connecting-rods *f*, and elastic material intervening between the cross-head and the rams, for the purposes set forth.

2. In a plunger-pump, the false head *c'* and rim c^2, bolted to the end of the ram *c*, in combination with the india-rubber springs or cushions 4 between the ram and the head, for the purposes set forth.

3. The combination, with the cylinder *b* and ram *d*, of the valve *o*, closing against the end of the cylinder *b*, and the valve *q* within the valve *o*, and having its seat in said valve, substantially as set forth.

4. The exit-valve closing against the end of the cylinder, and provided with a tubular stem having an inlet opening or port, in combination with the induction-valve, a cylinder in which the tubular valve-stem slides, and a packing at each side of the inlet-port of the tubular stem, substantially as set forth.

5. In a plunger-pump, the annular grooves around the interior of the cylinder at the place where the packing for the plunger is required, in combination with a means for supplying into such annular grooves the lubricating material under pressure, substantially as set forth.

6. The combination, with the pump, of an exit-valve closing against the end of the cylinder, a tubular stem to the same of much smaller diameter than the valve, a cylinder provided with packings through which the tubular stem slides, a port connecting the exit-chamber with the rear of the cylinder containing the tubular valve-stem, a port in such tubular valve-stem, and an inlet-valve within the exit-valve, substantially as set forth.

Signed by me this 8th day of October, A. D. 1878.

E. G. WHEELER.

Witnesses:
HAROLD SERRELL,
GEO. T. PINCKNEY.