(No Model.)

T. NORTHEY.

DOUBLE ACTING PUMP.

No. 345,253. Patented July 6, 1886.

fig: 2.

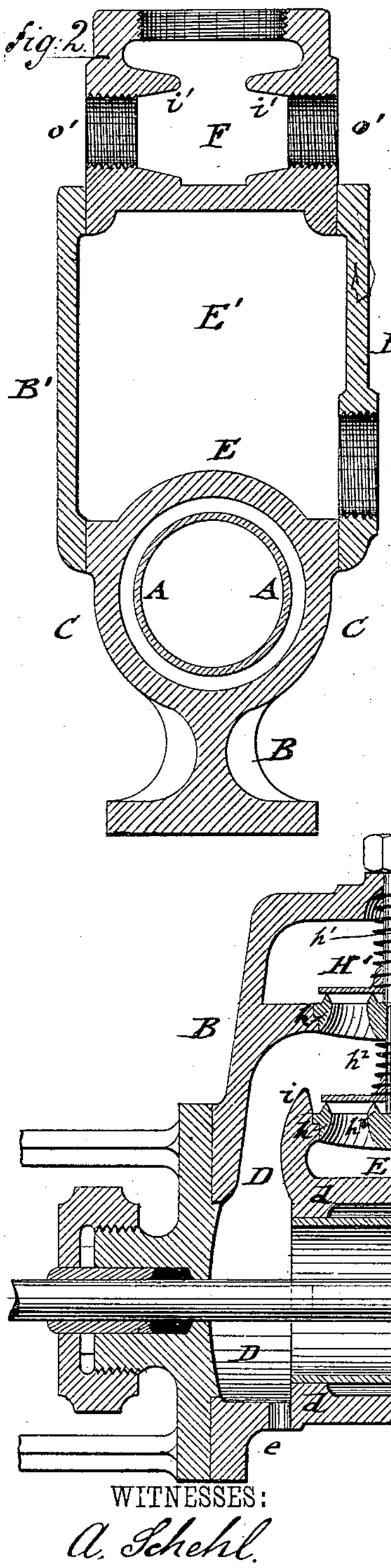


fig: 1.

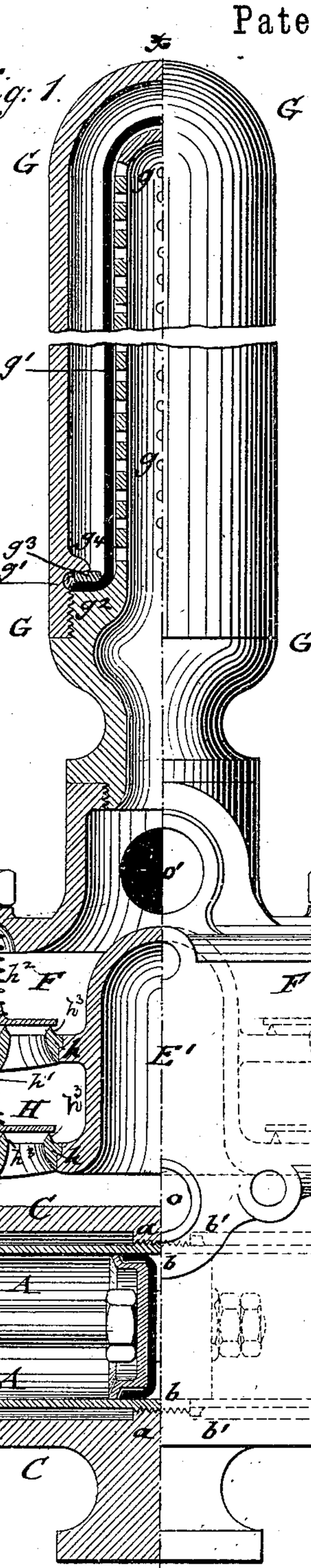


fig: 3.

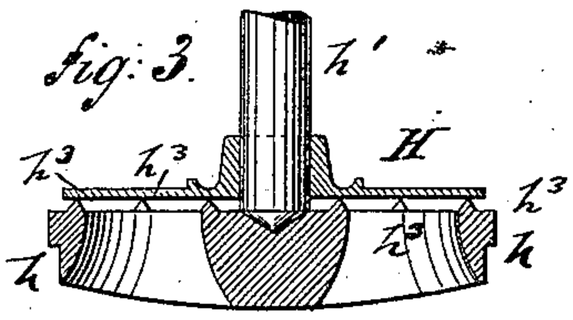
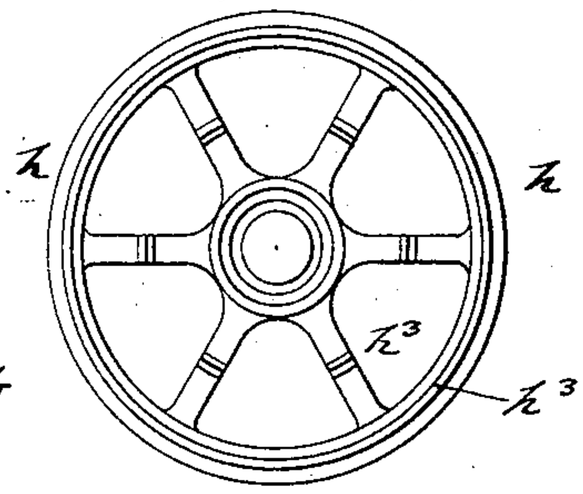


fig: 4.



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THOMAS NORTHEY, OF TORONTO, ONTARIO, CANADA.

DOUBLE-ACTING PUMP.

SPECIFICATION forming part of Letters Patent No. 345,253, dated July 6, 1886.

Application filed June 7, 1883. Renewed April 9, 1885. Serial No. 161,722. (No model.)

To all whom it may concern:

Be it known that I, THOMAS NORTHEY, of Toronto, Province of Ontario, Canada, have invented certain new and useful Improvements in Double-Acting Pumps, of which the following is a specification.

This invention has reference to certain improvements in double-acting pumps in which the piston is connected directly to the piston-rod of a steam-engine, or driven by any other suitable power, and in which the suction-chamber is provided with a suction-cavity equalizing the inflow of fluid; and the invention consists, first, of a novel connection of the pump-cylinder with the surrounding pump-casing, so as to admit the expansion and contraction of the former; secondly, of a novel construction of the air-chamber, which is provided with an interior perforated pipe that is covered by a continuous elastic diaphragm; and, lastly, of certain details of construction which will be more fully pointed out in the specification, and finally be defined in the claims.

In the accompanying drawings, Figure 1 represents a side elevation of my improved double-acting pump, one-half being shown in vertical longitudinal section. Fig. 2 is a vertical transverse section of the same on line *x* *x*, Fig. 1, the air-chamber being removed; and Figs. 3 and 4 are respectively a vertical transverse section of one of the valves and valve-seats, and a top view of the valve-seats.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A represents the pump barrel or cylinder, which is made of brass or other suitable metal, and secured to the interior of a cylindrical lower portion, C, of the pump-casing B. The casing C is concentric to the pump-cylinder, and provided at its middle portion with an interior projecting and screw-threaded collar, *a*, into which is screwed the pump-cylinder A by an exterior threaded circumferential projection, *b*. The pump-cylinder A is provided next adjoining to the projection *b* with a collar, *b'*, that abuts against the collar *a* when the cylinder A has been fully screwed in. At the outer end of the pump-cylinder A, on the same side to which the collar *b'* is applied, is arranged a second collar, b^2, (shown in dotted lines in Fig. 1,) which has at diametrically-opposite points recesses b^3 for the insertion of a wrench, by which the pump-cylinder is screwed into position. The opposite end of the pump-cylinder is turned off smooth and accurately fitted to the inwardly-projecting lugs *d* at the opposite end of the cylindrical portion C.

Between the central threaded projection, *b*, and collars *b'* b^2 at one end of the pump-cylinder and the interior collar, *a*, and lugs *d* *d* of the cylindrical portion C of the casing B annular cavities are formed at both ends between the cylinder and casing, in which the water can freely play, so as to avoid not only any undue pressure on the cylinder, but also the danger of freezing, as the water in the cavities is drained off through the bottom openings, *e* *e*, of the pump-casing C after use, which are tightly closed during the working of the pump. Another advantage of the connection of the pump-cylinder, especially when pumping hot water, is that the cylinder can expand and contract in either direction without disturbing its connection with the pump-casing or without injury to the pump-cylinder itself.

Above the pump-casing C is arranged the suction-chamber E, which is connected with the opposite ends of the pump-cylinder A by channels D D. The suction-chamber E is provided at its center with a dome-shaped suction-cavity, E', which is located at the inside of the pump-casing intermediately between the suction and delivery valves, and as near as possible to the inlet-opening *o* of the suction-pipe, for the purpose of preventing the irregular action or ebbing and flowing of the water in the suction-pipe and suction-chamber at the return-stroke of the pump. As the water flows up into the suction-cavity the thumping and hammering of the water in the suction-pipe and pump are prevented, and thereby a main objection to the steam or other pumps heretofore in use overcome. This suction-cavity forms a receiver or receptacle for the incoming water, which equalizes the flow of the same.

Above the suction-chamber E and its valve is arranged the delivery-chamber F F, which communicates with the suction-chamber by

openings and valves in the usual manner. It is provided with an orifice, *o'*, for the delivery-pipe at one or both sides, according as a delivery-pipe at one or both sides of the pump is to be used. The suction and delivery chambers E and F are provided with valve-seats *h* for the valves H and H'. The valves are cushioned, so as to slide on their stems *h' h'*, by spiral springs h^2. The faces of the valve-seats *h* or of the valves are provided with annular ridges or projections h^3, which ridges produce the more intimate closing of the valves. From the seats of the suction-valves H projections or lips *i* extend in upward direction, by which the suction-valves H are protected against the upward current of the water passing up in the channels D to the delivery-chamber F. At the upper part of the delivery-chamber F are arranged inwardly-projecting horizontal lips *i' i'*, (shown in Fig. 2,) by which the flow of the water to and through the delivery-pipe is equalized. Above the delivery-chamber F is arranged an air-chamber, G, at the interior of which is arranged an upright perforated pipe, *g*. An elastic diaphragm, *g'*, extends around the exterior circumference of the pipe *g*, and is secured to a shoulder, g^2, at the base of the same by a metallic ring, g^3. This ring is again held in position by an inwardly-projecting shoulder, g^4, of the exterior casing of the air-chamber G, between which and the rubber diaphragm *g'* an air-space is formed, that serves to cushion the diaphragm, while the latter forms an expansible chamber for the water in the perforated pipe *g*. By this construction of the air-chamber the air cannot escape, as is the case in air-chambers of the usual construction, so that it forms a very effective air-cushion for the water, while the air-space around the elastic diaphragm will always be kept intact and form an air-cushion for the diaphragm *g'*, which vibrates back and forth, according to the pressure exerted thereon by the water. The pump is closed at the sides by means of side plates, B', which are removable in order to examine the valves. The side plates, B', are reversible, so that the pump can be fitted up with the suction-pipe *o* at either side of the pump-casing, as most convenient in putting up the pump. The water-conducting channels at the interior of the pump-casing are rounded off and so proportioned that the water flows easily through the same without being obstructed by sharp corners or contracted channels, so as to facilitate the working of the pump and render the same more effective in use.

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

1. The combination, with the pump-casing B, having a cylindrical portion, C, of a pump-cylinder, A, connected thereto at its center and fitted thereto by projections at both ends, so as to form intermediate cavities for the free play of the water, substantially as set forth.

2. In a double-acting pump, the combination of the cylindrical casing C, having a threaded projection, *a*, at its middle part, and lugs *d d* at one end thereof, with a pump-cylinder, A, having an exterior threaded portion, *b*, a collar, *b'*, adjoining the same, and a collar, b^2, at the end opposite to the lugs of the casing, the collar b^2 being recessed to apply a wrench, substantially as and for the purpose set forth.

3. In a double-acting pump, the frame supporting the suction-valves, located beneath the delivery-valves and provided with upwardly-projecting guards or lips *i*, as and for the purpose shown and set forth.

4. In a double-acting pump, the delivery-chamber F, provided with inwardly-projecting lips *i' i'*, for the purpose of causing the easier flow of water to the delivery-pipe, substantially as set forth.

5. The combination of a pump-cylinder, A, a suction-chamber, E, having a central upwardly-extending suction-cavity, E', suction and delivery valves H H' at both sides of said cavity, a delivery-chamber, F, and an air-chamber, G, provided with an interior perforated pipe, *g*, inclosed by an exterior elastic diaphragm, *g'*, substantially as set forth.

6. In a double-acting pump, an air chamber, G, having an interior perforated pipe, *g*, and an elastic diaphragm, *g'*, extending around the perforated pipe and secured to the base of the same, substantially as set forth.

7. In a double-acting pump, the combination of an exterior closed air-chamber, G, an interior perforated pipe, *g*, an elastic diaphragm, *g'*, extending around the perforated pipe *g*, a fastening-ring, g^3, by which the diaphragm is secured to the base g^2 of the perforated pipe, and an annular lug or collar, g^4, of the air-chamber by which the fastening-ring g^3 is retained in position, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

THOMAS NORTHEY.

Witnesses:
PAUL GOEPEL,
SIDNEY MANN.