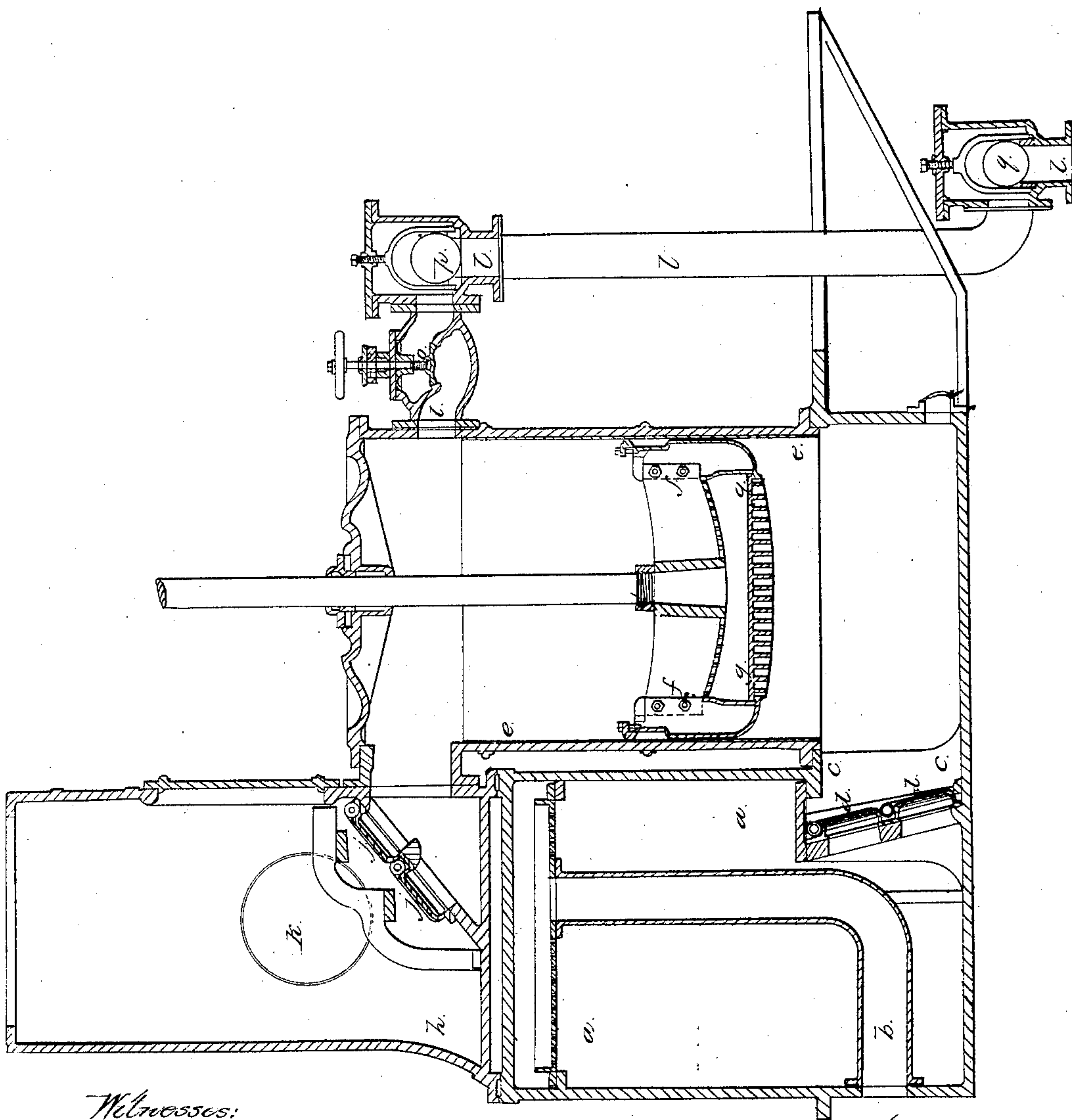


D. Barnum,

Steam Pump.

N^o 20,136.

Patented May 4, 1858.



Witnesses:
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UNITED STATES PATENT OFFICE.

DANIEL BARNUM, OF JERSEY CITY, NEW JERSEY.

STEAM-ENGINE.

Specification of Letters Patent No. 20,136, dated May 4, 1858.

To all whom it may concern:

Be it known that I, DANIEL BARNUM, of Jersey City, county of Hudson, and State of New Jersey, have invented certain new and
5 useful improvements in connection with marine steam-engines for the purpose of enabling the air-pump to act as a bilge-pump in a more efficient and better manner than has been heretofore essayed, and that
10 the following specification, taken in connection with the drawings, is a full, clear, and exact description thereof.

The drawing represents a vertical section, through the condenser, channel-way air
15 pump and hot well of a marine steam engine, and their usual accessories and also a vertical section through my improvements in combination therewith.

In condensing marine engines as ordinarily constructed, and by marine engines I mean all such engines applied to the propulsion of vessels, there are usually in connection with the condenser one or more pipes which connect the interior of the condenser,
25 with the water outside of the ship, and supply through their bore the injection water necessary for the condensation of the steam which passes through the cylinder; and these pipes are furnished with proper valves
30 for regulating or entirely stopping the flow of water through them. The water rushing through such pipes is used for condensation under ordinary circumstances, but as vessels from accident, severe straining or age often
35 leak more than their ordinary bilge pumps can remove, or ship seas, or in other ways become encumbered with water which it is necessary to remove promptly they have been and are usually attached to marine
40 engines, one or more pipes connecting the interior of the ship with the interior of the condenser; these pipes are provided with proper valves for checking or controlling the flow of water through them and when
45 such valves are open permit water that may have accumulated in the ship to be forced into the condenser; there being a vacuum or partial vacuum in the condenser and the atmosphere pressing upon the water in the
50 ship's hold. Such pipes are usually termed bilge injections and are used either in conjunction with the ordinary injections or alone as circumstances may require, the latter practice being the proper one when so

much water has accumulated in the hold 55 that the ends of the bilge injection pipes are continually under water. The use of these injections is attended with several inconveniences. First they must be used in connection with the ordinary injection pipes 60 unless their ends are always under water, and in such event they require constant attention to their valves to prevent air entering into the condenser, and cannot at any moment be permitted to deliver the whole 65 quantity of water which could be removed by the air pump. Second when their ends are constantly under water and therefore used alone, they can be permitted to deliver into the condenser only a little more water 70 than is absolutely necessary for condensation, for the reason that too great a flow chokes up the necessary space in the condenser, while the mechanically mixed air entering with the water impairs the vacuum. 75 And these bilge injections are objectionable thirdly for the reason that all the coal dirt, chips and other accumulations in the bottom of the ship, must be kept out by strainers or enter the pipes. If strainers are em- 80 ployed there is danger of their stopping up when so far under water that they cannot be cleared; if none are used these solid accumulations must pass by the foot and butterfly valves and generally tend to impede 85 and sometimes entirely stop their operation. In spite of these objections bilge injections are in almost universal use, their demerits being more than balanced by their utility and my invention remedies all their defects. 90

The nature of my invention consists in combining with an ordinary air pump a pipe leading from a point therein substantially such as is specified and prolonged to some point near the bottom of the vessel substantially as hereinafter set forth, such pipe 95 being provided with a proper valve or valves and the whole being for the purpose and acting substantially as hereinafter specified. 100

In the drawings *a* is a condenser of any ordinary kind provided with an ordinary injection pipe *b* which may be led through the planking of the ship at any convenient point. This condenser has a channel way *c*, provided with foot valves *d d*, in connection with which is an air pump *e* provided with a piston *f* having in it a proper seat and valve 105

g g and this pump is in connection with a hot well *h*; proper delivery doors *j j* being applied between the two. This hot well is in connection with the outside of the ship
 5 by a pipe *k* commonly known as a discharge or waste pipe, through which the air, water and vapor delivered by the pump pass over-board. These parts are drawn as now in use
 10 to serve as a type of all constructions as the kinds of valves pumps, condensers or bucket or the position relative or actual of the parts have nothing to do with my invention which is applicable to various ordinary construc-
 15 tions of these parts or their equivalents.

At or near the top of the pump a hole is made in it; and this hole connects with a pipe *l* properly attached and leading to some convenient point at the bottom of the
 20 vessel or nearly so: the pipe making a direct connection between the cavity of the hold and the air pump. This pipe is in the present instance provided with three valves one only being absolutely necessary; these valves
 25 are lettered *o*, *p* and *q*; the former being what is technically termed a stop valve and the other ball valves but any kind of stop valve may be substituted for that represent-
 30 ed or any kind of valves that will open toward the air pump and shut at proper times may be used in place of the ball valves. Now in the ordinary action of the engine, the stop valve is kept shut, and it needs no
 35 explanation to show that the air pump will then act just as if neither pipe nor valves were there. But when water accumulates in the bottom of the vessel, the stop valve is to be opened; the air pump bucket then
 40 after delivering the water above it descends, forming a vacuum or partial vacuum in the pump above the bucket; water will then rise through the pipe lifting the two ball
 45 valves and enter the pump and will continue to enter and fill the vacuum as fast as the bucket descends, until the piston has compressed the vapor and air underneath it to a pressure a little greater than that of
 50 the atmosphere, when the bucket valve will open and the ball valves will fall, the flow of water through the pipe will cease and the piston will descend below the condens-
 55 ing water previously drawn from the condenser completing its stroke, and upon its ascent, it will deliver all the water above it, both that received from the pipe and from the condenser, and in descending again, the
 60 air pump will first draw water out of the hold through the pipe and then cease as soon as it begins to perform its usual office upon the condensed and condensing water from the condenser. Now it will be per-
 65 ceived as resulting from this combination that the air mechanically mixed with the bilge water does not enter the condenser, neither does the rubbish accompanying that

water, so that the vacuum is not impaired, and the foot valves are not liable to be choked. Secondly that even if the bottom of the pipe be uncovered by water for a
 70 longer or shorter time permitting air instead of water to pass through it, that even this would not injure the vacuum in the con-
 75 denser. Third that there may be delivered through the pipe a quantity of water much larger than is absolutely necessary for con-
 80 densation, and I intend to use this combination in conjunction with an ordinary bilge injection, so that water sufficient for con-
 85 densation may be furnished by the latter when its end is wholly immersed and then I
 90 can run the engine with a certainty of unimpaired vacuum and with the effect of throwing out of the bilge the greatest quan-
 95 tity of water that the engine is capable of delivering with a given capacity of air
 100 pump. All these improved results flow from connecting an independent suction pipe from the hold of the ship directly with the
 105 air pump. The precise point of connection of this pipe may be varied without varying
 110 the result or departing from the principles of my invention, for instance it may be connected at a point below the highest position
 115 of the piston so that the piston shall pass over its orifice as it moves back and forth,
 120 but in such event care must be taken so to place it that the air pump bucket will move far enough to free the condenser properly
 125 at each stroke before it can take any suction through the pipe connected with the
 130 hold of the vessel: the object being that the pump shall at all events perform its usual duty of freeing the condenser, and when that is done act to the extent of its remain-
 135 ing capacity as a bilge pump.

I have said that only one valve in the pipe is absolutely necessary and proceed to explain the reason. The stop valve is to prevent unnecessary action of the appara-
 140 tus, the upper ball valve to prevent water from being driven back into the hold, and the lower ball valve to act in place of the upper if rubbish should for a time prevent
 145 it from seating itself and to serve as a foot valve to keep the pipe charged, and this is
 150 the best arrangement that I know of, but the apparatus will work nearly or quite as well with one valve only, opening toward
 155 the air pump and located in any part of the pipe. Such a valve should be fitted with
 160 a screw or some equivalent for the purpose of holding the valve upon the seat when the apparatus is not in use, and by relieving it
 165 from the pressure of this screw the apparatus would be put in working order.

I wish it distinctly understood that my invention of combining an independent suc-
 170 tion pipe with an air pump, in addition to the ordinary connection with the condenser is a combination with any or all kinds of
 175

marine engine air pumps and is not limited to the precise kind of pump shown in the drawings.

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

Combining with an air pump of a marine engine, an independent or separate suction pipe, connecting the hold of the vessel with the air pump directly, and not through the channel way or condenser, such pipe being

connected, and the combination being, substantially such, as is hereinbefore set forth.

In testimony whereof I have hereunto subscribed my name in the city of New York on this fourth day of February A. D. 1858.

DANIEL BARNUM.

In presence of—

O. G. BARNUM,

E. A. BARNUM.