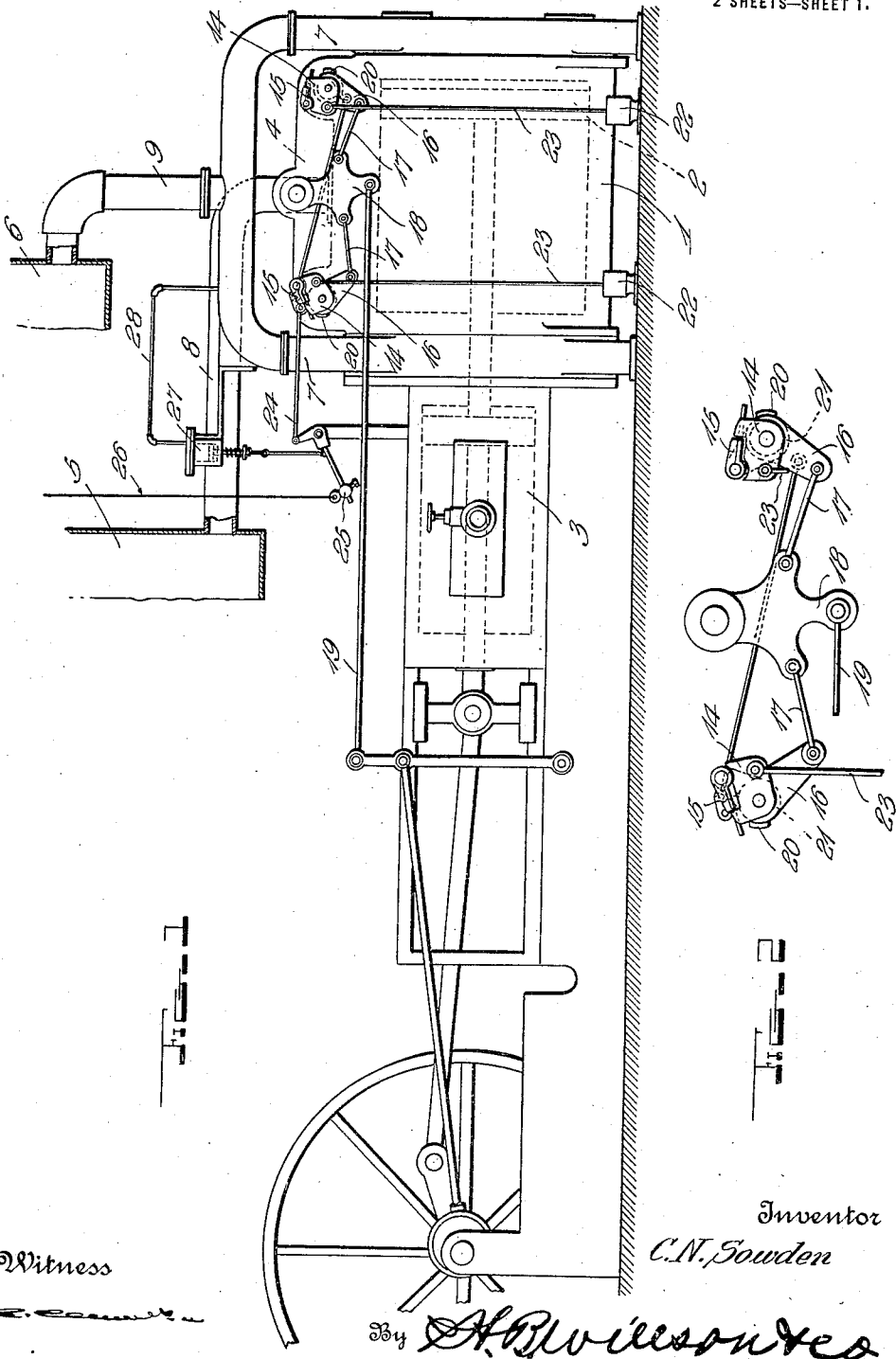


C. N. SOWDEN,
VACUUM PUMP,
APPLICATION FILED APR. 22, 1918.

1,298,112.

Patented Mar. 25, 1919.
2 SHEETS—SHEET 1.



Witness
[Signature]

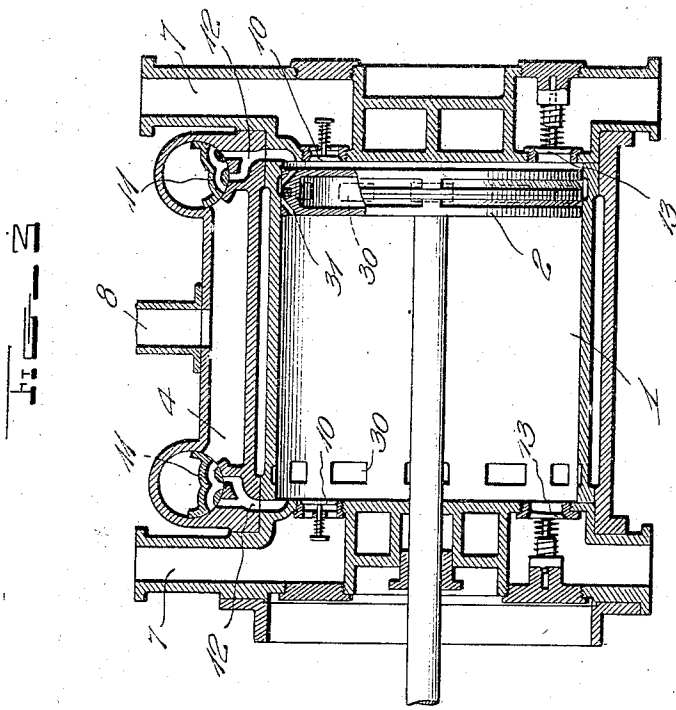
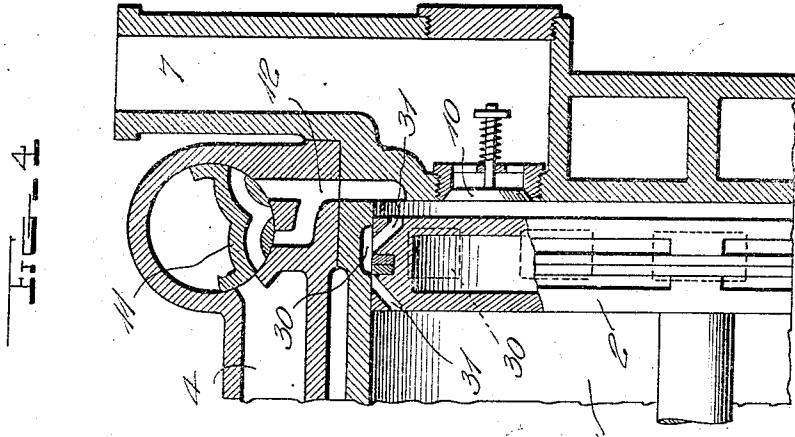
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UNITED STATES PATENT OFFICE.

CHARLES NEVILLE SOWDEN, OF CENTRAL CARACAS, CUBA.

VACUUM-PUMP.

1,298,112.

Specification of Letters Patent. Patented Mar. 25, 1919.

Application filed April 22, 1918. Serial No. 230,178.

To all whom it may concern:

Be it known that I, CHARLES N. SOWDEN, a subject of the King of England, residing at Central Caracas, Santa Clara, Cuba, have invented certain new and useful Improvements in Vacuum-Pumps; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in vacuum pumps of the type used principally in sugar refining for maintaining relatively high and low vacuums in different chambers. In pumps of this class (see my U. S. Patent 1,160,207 and my pending application Serial No. 217,912, filed Feb. 18, 1918) valves have been employed for equalizing the pressure on opposite sides of the pump piston at the end of each stroke, but the object of the present invention is to eliminate such valves by forming coacting ports in the cylinder and piston for obtaining the same result.

With the foregoing general object in view, the invention resides in the novel features of construction and unique combinations of parts to be hereinafter fully described and claimed, the descriptive matter being supplemented by the accompanying drawing which forms a part of this specification and in which:

Figure 1 is a side elevation of a pump embodying my invention;

Fig. 2 is an enlarged side elevation of the suction controlling valve mechanism;

Fig. 3 is a longitudinal section of the pump cylinder with the piston partly in elevation; and

Fig. 4 is an enlarged vertical section showing the coacting ports in the cylinder and piston.

In the drawings above briefly described the numeral 1 designates the pump cylinder, 2 the piston in said cylinder, 3 a steam or other suitable engine for reciprocating said piston, 4 a valve chest, 6 a high vacuum chamber and 5 a relatively low vacuum chamber, said chamber 6 having approximately a 27 inch vacuum. A pair of main suction passages 7 are connected by a main suction conduit 9 with the chamber 6 while a secondary suction conduit 8 leads from the chest 4 to the chamber 5. Communication between the ends of the cylinder 1 and the main suction passages 7 is controlled by inwardly opening

check valves 10 and oscillating valves 11 are employed for placing the ends of said cylinder in communication with the secondary suction conduit 8, by way of the chest 4 and ports 12. The exhaust from the cylinder takes place through outwardly opening check valves 13.

The operating means for the valves 11 is preferably as follows: A pair of arms 14 are secured on the outer ends of the valves in question and coast with dogs 15 mounted on oscillating arms 16 which move independently of the valves, said arms 16 being actuated by links 17 pivoted to a main operating arm 18, this arm being pivoted to the chest 4 and actuated by the engine 3 through suitable connections 19. The dogs 15 so act on the arms 14 as to open the valves 11 at the proper times and said dogs are released by coming in contact with cams 20 on release collars 21. When this release of the dogs 15 takes place, the valves 11 are quickly closed by the dash pots 22 which are connected by rods 23 with the arms 14.

Suitable connections 24 including a weight are employed to normally hold the collars 21 against movement and when the dogs 15 are to be manually tripped, a control cable 26 may be pulled to properly actuate said connections 24. Also, it is intended that when the vacuum in chamber 5 reaches the required degree, the connections 24 shall be operated to release the dogs 15, and for this purpose, a suction operated piston in the cylinder 27 is employed, said piston being operatively associated with the connections 24, while said cylinder is connected to the secondary suction conduit 8 by a pipe 28.

The parts so far described briefly may be found in my pending application above referred to but it may be well to explain their operation to some extent. To this end, it may be said that upon each stroke of the piston 2, suction is created through conduit 9 and the vacuum in the cylinder behind the piston becomes equal to that in the chamber 6 (approximately 27 inches). Also upon each stroke of the piston 2, the valve 11 in advance of said piston is opened at the proper time and then closed. The vacuum in front of the piston is less than 27 inches, due to the arrangement to be described and it thus follows that as the pressure in the cylinder 1 and chamber 5 equalize upon communication through 8, 11 and 12, the

vacuum in said chamber will remain less than 27 inches. The pressure in the two chambers 5 and 6 is thus always unequal as is necessary.

5 At the completion of each stroke, the vacuum behind the piston is equal to that in the chamber 6, but since the valve 11 closes before the piston completes its stroke, the pump exhausts through the valve 13
10 which it is approaching, and consequently the part of the cylinder in advance of the piston contains no vacuum. It thus follows that if the two ends of the cylinder are placed in communication at the end of the
15 stroke, the equilibrium of pressure which takes place in said ends will reduce the vacuum in rear of the piston, and since it is this vacuum that next acts on the secondary suction conduit 8, it follows that the vacuum
20 in the latter will be lower than that in the chamber 6.

As hereinbefore pointed out, valves have heretofore been employed for placing the ends of the cylinder in communication, but
25 to simplify the construction and operation of the pump, I get the same result by forming bypasses or ports 30 in the inner side of the cylinder 1 adjacent the ends of the latter and other ports 31 in the piston 2, said
30 last named ports opening through the periphery and sides of the piston, so that as they register with the ports 30 as seen in Figs. 3 and 4, the required balance of pressure will take place.

35 From the foregoing, taken in connection with the accompanying drawings it will be obvious that I have devised a very simple construction for obtaining the required end and since probably the best results are obtained
40 from this construction, it is preferable. It is to be understood however that within the scope of the invention as claimed

considerable latitude for development and the making of minor changes is allowed.

I claim:

1. In a vacuum pump in which a balance
45 of pressure must be created after each stroke, the combination with the pump cylinder and its piston, of ports in the wall of said cylinder adjacent its ends and of less width
50 than said piston, said piston having ports opening through its periphery and through its sides for registration with said wall ports for permitting communication between the
55 ends of the cylinder to create said balance of pressure.

2. In a vacuum pump for acting simultaneously upon main and secondary vacuum chambers, the combination of a cylinder closed at both ends, a main valve-
60 controlled suction inlet for each end of said cylinder through which suction is created in the main vacuum chamber, a valve controlled exhaust for each end of the
65 cylinder, a piston in said cylinder for creating suction through said main suction inlets, piston-opened port means for placing the non-suction and suction ends of the cylinder in communication at the ends of the
70 piston stroke to produce a balanced and reduced vacuum in the cylinder, said piston-opened port means consisting of co-acting ports in the piston and the cylinder wall, and valve-controlled secondary suction ports
75 for the ends of the cylinder through which said reduced vacuum acts on the secondary vacuum chamber.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CHARLES NEVILLE SOWDEN.

Witnesses:

LEOPOLDO ROMAGOSE,
FRANCES M. NUFER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."