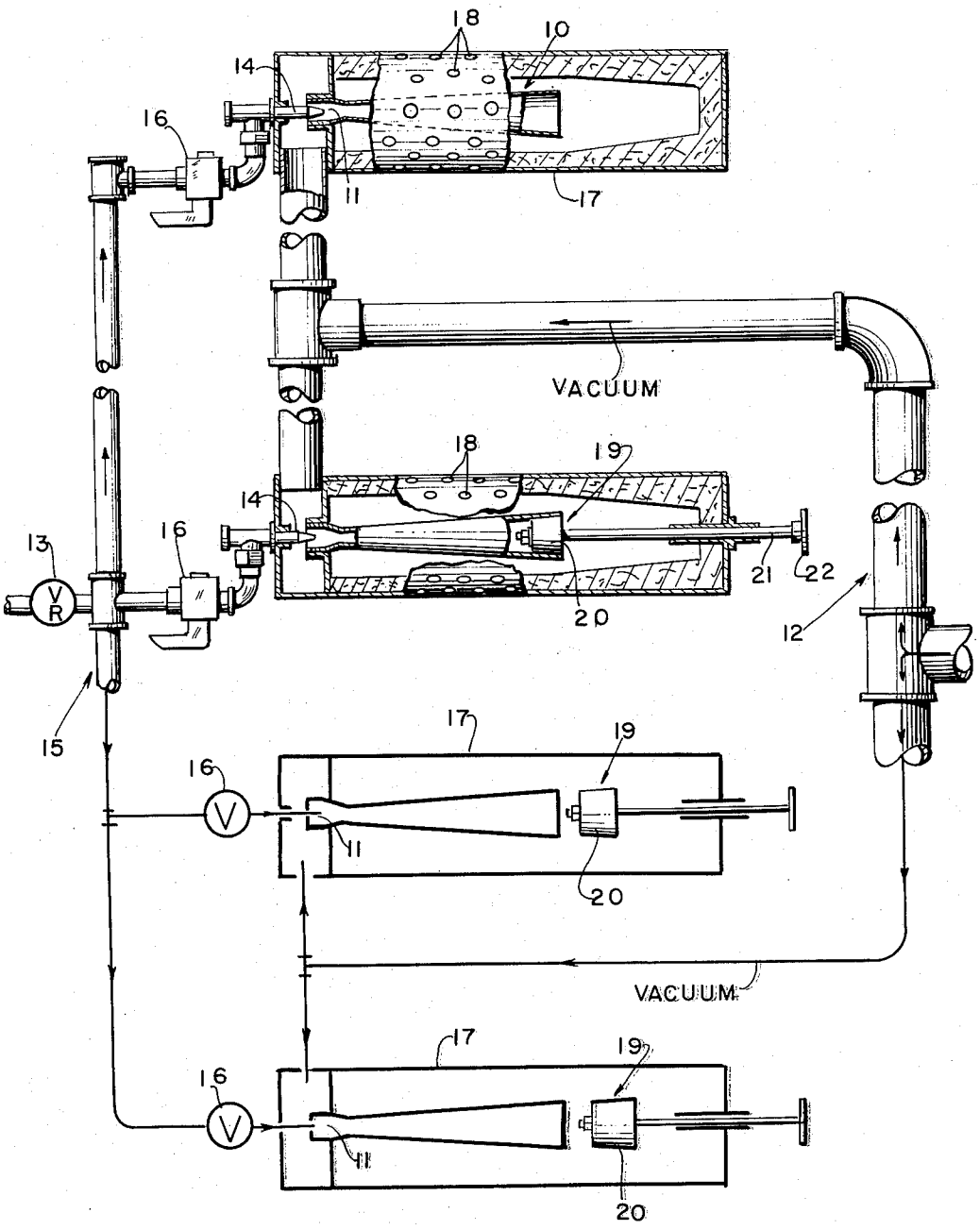
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SUCTION CREATING APPARATUS

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INVENTOR
FRANK P PENDLETON
BY
Ernest A. Jensen
ATTORNEY

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SUCTION CREATING APPARATUS

Frank P. Pendleton, Montclair, N.J., assignor to Vac-U-Max, Belleville, N.J., a corporation of New Jersey

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The present invention relates to apparatus for creating suction, and, more particularly, to such apparatus wherein the volume of induced air can be varied while maintaining the same high suction or vacuum power.

Heretofore, highly effective venturi apparatus such as shown in United States Patents 2,863,525 and 2,913,120 has been developed for creating suction to move fluid material from a storage bin or tank to a hopper or other receptacle. In the course of this development, applications of use have been encountered which at certain times required an extremely high volume of induced air flow. While it would seem that the solution to this problem would be to design a very highly efficient venturi capable for achieving peak requirements and operating the same at a lower level to produce a lesser degree of suction when desired, the construction and operation of such apparatus in the foregoing manner is a poor approach to the solution of the problem because the apparatus would not be operated at its utmost efficiency at all times.

Accordingly, an object of the present invention is to provide apparatus of the foregoing type which is economical in construction and is operated at its utmost efficiency over a wide range of varying volumes of induced air flow, while maintaining the same degree of high vacuum power.

Another object is to provide such apparatus wherein the heretofore developed venturi type ejector pumps can be utilized.

A further object is to provide simple, practical, and reliable valving for such apparatus by which the volume of air flow can be varied.

Other and further objects of the invention will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

In accordance with the present invention, the foregoing objects are accomplished by providing apparatus which generally comprises a plurality of gas operated ejector pumps each including a venturi having a gas inlet and a gas outlet, a separate suction intake chamber enclosing the inlet of each venturi and formed with opening means, and a nozzle extending into the chamber for directing gas under pressure into the inlet whereby air in the chamber is entrained; a manifold connected independently to all of the chamber opening means in which suction is created; and valve means for rendering certain of the ejector pumps ineffective without affecting the efficiency of the other ejector pumps whereby the volume of induced air flow can be varied without loss in suction power and/or operating efficiency.

A preferred embodiment of the invention has been chosen for purposes of illustration and description, and is shown in the accompanying drawing, forming a part of the specification, wherein the single FIGURE is a diagrammatical view of apparatus in accordance with the present invention, certain of the ejector pumps being shown in longitudinal section and other ejector pumps being shown schematically.

Referring to the drawing in detail, apparatus is shown which generally comprises a plurality of venturi-like ejector pumps 10 each having a separate suction intake chamber 11 provided with opening means and a manifold 12 connected independently to all of the opening means of

the chambers 11. While four ejector pumps have been shown by way of example for simple but comprehendable illustration of the present invention, it will be understood that the invention could be practiced with two, three or a greater number ejector pumps depending upon operating requirement.

Each of the ejector pumps 10 also has a nozzle 14 for directing compressed air or steam into the chamber 11 and each nozzle is connected to a manifold 15 for supplying compressed air or steam through a shut-off valve 16. The compressed air or steam is supplied to the manifold from a suitable source through a pressure regulator 13. Preferably, the ejector pumps 10 are enclosed in a casing 17 formed with openings 18 which serves as a muffler.

As shown herein, three of the four ejector pumps 10 are equipped with a valve 19 for shutting off fluid flow communication between the outlet of the pump and the opening means of the chamber 11. In the preferred and illustrated embodiment shown in the drawing, the valves 19 comprise a plug-like closure 20 adapted to be inserted into the flared outlet end of the pump, a stem 21 slidably mounted in the wall of the casing 17 facing the pump outlet and having the closure mounted on its inner end, and a handle 22 secured to the outer end of the stem for placing the closure in open and closed positions.

In operation when a high volume of air flow is desired, all of the closures 20 are withdrawn to open the outlet end of the pumps and all of the valves 16 are opened to compressed air or steam through the nozzle 14 and into the chamber 11, whereby all of the ejector pumps function to draw air from the manifold 12 and create suction. In the event a lesser volume of air flow is desired, one or more or all of the closures are inserted into the outlet end of the venturis to close the same and the valves 16 associated with the pumps so closed are also placed in closed position to shut off the supply of air or steam to the nozzles 14, whereby atmospheric air cannot be drawn into the pump or pumps which are functioning by way of the outlet end and the interconnected intake chambers 11. In this manner, the non-functioning pumps are isolated from the functioning pumps without loss of efficiency of the apparatus.

While the intake chambers 11 are shown coupled in pairs to the manifold 12, equivalent coupling means could be provided, for example, a ring connected to each of the intake chambers having a line connected thereto for drawing air from the zone where the vacuum is created.

From the foregoing description, it will be seen that the present invention provides simple and efficient apparatus for a high degree of vacuum and varying volumes of air flow to move fluid materials.

As various changes may be made in the form, construction and arrangement of the parts herein, without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matter herein is to be interpreted as illustrative and not in any limiting sense.

I claim:

1. In apparatus for creating suction by the entrainment of air to move fluid materials, the combination of a plurality of gas operated ejector pumps each including a venturi having a gas inlet and a gas outlet in communication with the atmosphere for discharging gas and entrained air into the atmosphere, a separate suction intake chamber enclosing said inlet of said venturi and being formed with opening means, and a nozzle extending into said chamber for directing gas under pressure into said inlet whereby air in said chamber is entrained; a valve for controlling the supply of gas to each of said nozzles; a manifold connected independently to all of said chamber opening means for delivering air to be entrained to said

chambers and in which suction is created; structural means disposed outwardly of each of said gas outlets and spaced thereform; and a valve for the gas outlet of certain of said ejector pumps including a closure operable for completely shutting off said outlet and mounting means for supporting said closure on said structural means for movement to position said closure outwardly of said gas outlet to fully open said gas outlet.

2. In apparatus according to claim 1, wherein all but one of said ejector pumps are equipped with said last mentioned valve.

3. In apparatus according to claim 1, wherein said closure is a plug adapted to be inserted into said gas outlet.

4. In apparatus according to claim 1, wherein said structural means and said closure mounting means include a muffler enclosing said venturi having an end wall facing and spaced from said gas outlet, and a stem slidably mounted on said end wall for inward and outward movement with respect to said gas outlet, said stem having its outer end positioned outwardly of said wall for manual operation thereof and having said closure mounted on its inner end.

5. Apparatus according to claim 4, wherein the outlet of said venturi is flared and said closure is a tapered plug adapted to be inserted into said venturi outlet end.

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