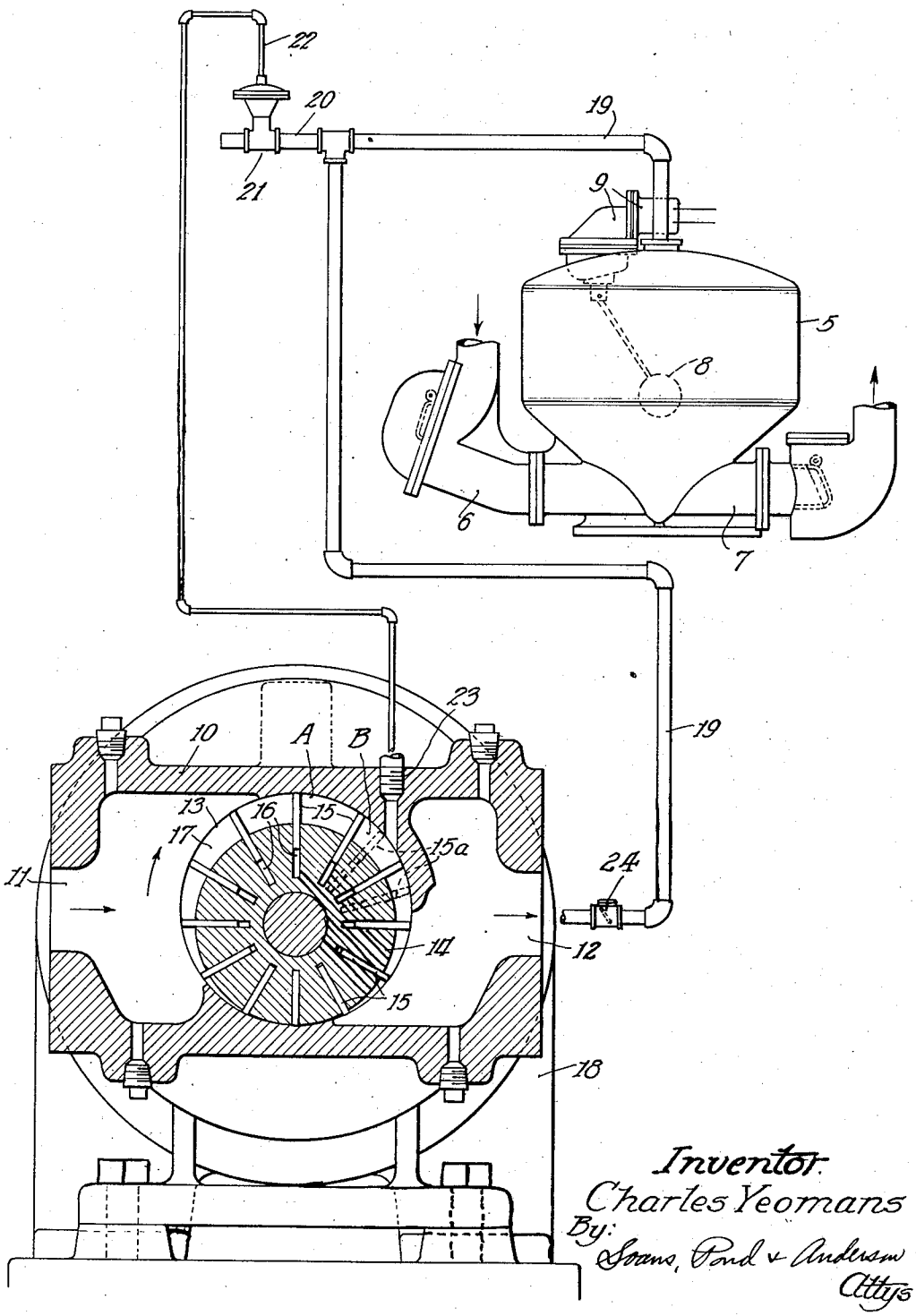
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AIR COMPRESSOR AND APPARATUS OPERATED THEREBY

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AIR COMPRESSOR AND APPARATUS OPERATED THEREBY

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This invention relates to improvements in air compressors and apparatus pneumatically operated thereby, and it has particular reference to an improvement in rotary air compressors whereby a more or less conventional type of rotary air compressor may be caused to deliver, in addition to the normal output of compressed air, an auxiliary supply of compressed air, wholly separated from said normal or main supply, so as to be unaffected by leaks, vents or other causes which prevent the compressor from building up a desirable amount of pressure in its normal outlet line.

The invention also relates to pneumatically-operated apparatus which, by the present invention, may be substantially simplified compared with equivalent apparatus available prior to the present invention.

An important object of the present invention is to provide an arrangement whereby a single air compressor may be caused to deliver a pair of relatively independent, and, in effect, independently produced, supplies of compressed air whereby one supply may be employed for controlling valves which, in turn, control the operation of pneumatically-operated mechanism.

Another important object of the invention is to provide pneumatically-operated mechanism, such as sewage ejecting mechanism, of a simplified character and wherein reliability of operation is increased, this object being attained by the replacement of certain electrical devices by pneumatic devices, which are less likely to become inoperative than are equivalent electrical devices.

Other objects and advantages of the invention will be understood by reference to the following specification and accompanying drawing wherein there is illustrated a selected embodiment of the invention.

In the drawing, the figure embodies a cross-sectional illustration of a rotary air compressor, and a more or less schematic illustration of sewage ejecting mechanism with which the compressor is associated for supplying the required compressed air for sewage ejection purposes.

Referring now to the drawing, the sewage ejecting mechanism illustrated embodies a closed receiver 5 having inlet and outlet connections 6 and 7 respectively. Suitable one-way check valves are provided in the inlet and outlet connections as indicated in dotted lines, to prevent reverse flow of the sewage.

Within the receiver 5, there is provided a float 8 which through suitable arm and link connections, operates an electric switch contained in a housing 9 mounted on top of the receiver 5. Sewage delivered to the receiver 5 from the inlet line 6 is ejected from the receiver when the level of sewage reaches a predetermined height at which the float-operated switch just referred to will be closed to initiate the operation of an air compressor.

The air compressor herein illustrated is of the rotary type embodying a housing 10 having main inlet and outlet openings 11 and 12 respectively. Intermediate the inlet and outlet openings, the housing is provided with a cylindrical chamber 13 which extends transversely of the line of the openings 11 and 12. As shown, the openings 11 and 12 communicate with the cylindrical chamber 13.

A rotor 14 is suitably journalled in the housing 10 for rotation within the chamber 13. The rotor is equipped with a series of vanes 15 which are radially slidably mounted in suitable slots 16 in the rotor body 14. The rotor is mounted eccentrically relative to the cylindrical chamber 13, and the arrangement is such that the vanes 15 are thrown outward by centrifugal force as an incident to the rotation of the rotor body 14. The vanes thereby maintain their outer edges in contact with the cylindrical wall of the chamber 13 and form cells 17 in the peripheral portion of the chamber 13 which is not occupied by the rotor body 14. The construction is such that a plurality of the vanes will at all times bridge said peripheral portion of the chamber 13 to thereby form relatively independent air cells A and B, which are not only disconnected from each other but also from the main inlet and outlet 11 and 12 of the compressor.

It will be observed that because of the eccentric relationship between the rotor body 14 and the wall of the cylindrical chamber 13, the air cell B is somewhat smaller in capacity than the air cell A, this being due to a narrowing of the radial dimension of the cell. It will also be apparent that each cell formed in the position of the cell A is gradually reduced to the size of the cell B, and to a still smaller size which occurs when the vanes forming such cell reach the positions illustrated by the dotted lines 15a.

An electric motor 18 is suitably connected to the shaft of the rotor 14 so that when the motor is energized and actuated, the compressor will also be actuated.

The compressor is connected by means of a pipe line represented schematically at 19, to the top part of the sewage receiver 5. In order that air may escape from the top of the receiver 5 to permit sewage to enter the same from the inlet line 6, a vent pipe 20 is provided as an extension of a portion of the compressed air line 19. The vent pipe 20 may, of course, be directly connected with the receiver 5, if preferred, but the illustrated arrangement is advantageous in that it simplifies manufacture and installation of the apparatus. The vent pipe 20 is provided with a diaphragm-operated valve 21, which is normally open so as to permit air to escape from the receiver. A check valve 24 is usually provided in the pipe line 19 to prevent air (and possibly sewage) from flowing from the receiver into and through the compressor even when not in operation.

The diaphragm-operated valve 21 has its air chamber connected by a relatively small bleeder pipe line 22 to an auxiliary port or outlet opening 23 provided in the compressor housing. As shown, the auxiliary port 23 communicates with a part of the peripheral portion of the cylindrical chamber 13 which, when the compressor is in operation, normally constitutes one of the air cells, such as the air cell B which contains compressed air.

The switch mechanism contained in the housing 9 is electrically connected to the electric motor 18 so that when the float 8 causes the switch to be closed, an electric circuit is completed to the motor 18, thereby to drive the compressor. The compressor will at once begin to deliver compressed air into the pipe line 19 but inasmuch as the valve 21 in the vent pipe 20 is open, the compressed air will escape through the vent pipe 20. However, compressed air delivered through the auxiliary outlet port 23 through the bleeder 22 quickly closes the diaphragm-operated valve 21 to thereby prevent further escape of compressed air from the main pipe line 19, whereupon the air pressure in the top of the receiver 5 will be quickly built up to effect ejection of the sewage content of the receiver through the outlet pipe 7.

As soon as the level of sewage in the receiver reaches a predetermined lower level, the motor-controlling switch will be opened, thereby breaking the energizing circuit for the motor and causing the compressor to stop operating. When the compressor stops operating, the loss of centrifugal force permits the vanes 15 in the upper portion of the rotor to recede into their respective slots so that air may then flow rearwardly through the compressor; hence, the air pressure in the chamber of the diaphragm valve 21 and in the pipe line 22 will be quickly dissipated, thereby permitting the valve 21 to open so as to again vent the receiver 5, whereupon sewage may again enter the receiver through the inlet 6. The diaphragm valve 21 is normally urged to an open position by spring or other suitable means forming a part of the diaphragm valve construction which may be of conventional form.

It will be observed that the control of the receiver vent opening by means of a pneumatic valve requires a source of compressed air which is, in effect, independent of the source of compressed air which supplies the required volume of air for ejecting sewage from the receiver. In the arrangement disclosed, the single rotary air compressor provides, in effect, the two required relatively independent sources of compressed air. The volume of compressed air required for operation of the diaphragm valve 21 is relatively small and reduces the main, or normal output capacity of the compressor only slightly, and only for the first few seconds of operation since as soon as the required air pressure has been built up in the diaphragm chamber of the valve and in the pipe line 22, there will be no further movement of air from a cell into the bleeder line, but the entire volume of air will then be delivered through the main outlet 12. Hence, the provision of the auxiliary port 23 does not materially affect the normal efficiency of the compressor.

In one commercial type of compressor embodying the construction illustrated, it has been found entirely feasible to depend upon the development of a minimum cell pressure of 6 pounds per square inch (gauge) which is adequate to operate diaphragm valves of the type herein referred to, and many other pneumatically-operated control devices. Hence, it will be apparent that the described compressor arrangement may be adapted to various other uses, such as the control of various lubricating devices from which oil is permitted, or caused, to flow at a predetermined rate but only when the lubricated apparatus is in operation.

Changes in the described apparatus and arrangement may be made without departing from the described invention.

I claim:

1. In pneumatic ejecting mechanism of the class described, a receiver for fluid materials, a vent for relieving air in said receiver, a normally open pneumatic valve for closing said vent, an air compressor for delivering compressed air to said receiver to thereby expel said materials therefrom, means for actuating said compressor, means responsive to a predetermined level of fluid in said receiver for initiating operation of said compressor actuating means, and means whereby said compressor, when actuated, delivers to said pneumatic valve, a supply of compressed air independent of the supply delivered to said receiver, for effecting closing of said vent valve to thereby enable said compressor to deliver sufficient compressed air to said receiver for expelling materials therefrom as aforesaid.

2. In pneumatic ejecting mechanism, the combination of a receiver for fluid materials, a vent connected to said receiver for relieving air therefrom, a normally open pneumatic valve for closing said vent, a rotary air compressor having an intake opening and main and auxiliary outlet openings for delivering independent currents of compressed air, a pipe line connecting said main outlet opening with said receiver, a pipe line connecting said auxiliary outlet opening with said pneumatic valve, means for driving said rotary compressor, means actuated by the fluid content of said receiver when it reaches a predetermined level for starting operation of said compressor driving means, thereby to cause the compressor to deliver separate and independent currents of compressed air respectively to said pneumatic valve for closing said vent, and to said receiver for effecting discharge therefrom of the fluid material received thereby.

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