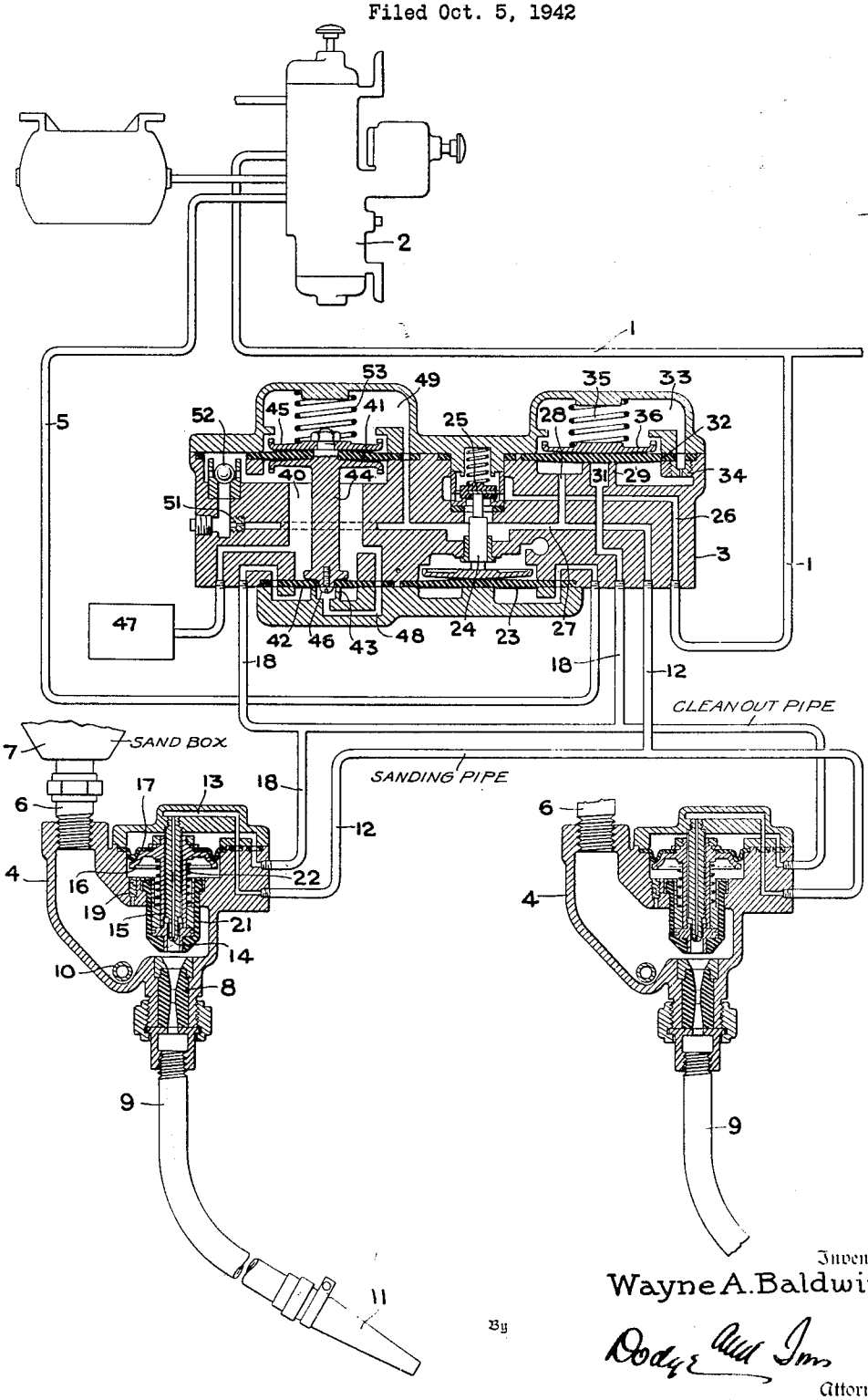
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TRACK SANDER

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TRACK SANDER

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This invention relates to rail sanders and particularly to a final cleanout valve which operates at the close of the sanding function to blow the sanding hose clean and reduce the risk of clogging.

With sand traps of the type claimed in the patent to Campbell No. 2,243,242, issued May 27, 1941, it has been customary to use for control purposes a rather expensive piston operated slide valve which first supplies cleanout air, then sanding air, and finally cleanout air. Such a valve is shown in that patent.

To render this type of trap available for less expensive installations, the present invention was developed. It is a relatively simple matter to time the initial cleanout blast by a well known timing valve of the diaphragm type, but such a valve will not time a final cleanout blast.

The present invention affords a second timing valve of novel type, which stores a volume of air under pressure during sanding, and delivers this air for cleanout purposes as sanding pressure fades out.

Thus two simple and inexpensive timing valves may be associated with one or more traps, one valve supplying the initial, and the other valve the final, cleanout air. In this way installation and maintenance costs are materially reduced. The timing cycles are precise enough for all except possibly very high speed equipment.

In the drawing the single view is a diagram, partly in section, of two traps and the controlling mechanism therefor.

Any reasonable number of adjacent traps may be controlled in unison by a single diaphragm timing valve unit provided the storage tank for final cleanout air be made of adequate volume. The timing valves can be constructed as a unit with a trap, but this requires space not usually available at the location of the trap.

In the drawing the pipe 1 is the air supply pipe and furnishes compressed air at suitable pressure to the engineer's sanding valve 2 and to the diaphragm valve unit 3 whose function is to control the operation of one or more sanding traps whose housings are indicated at 4 (two traps being illustrated).

The valve 2 is desirably constructed according to the Campbell Patent No. 2,222,604, issued November 26, 1940, and functions to deliver compressed air to sanding control pipe 5 to cause sanding and then to vent said pipe 5 to terminate sanding. Beyond this the special functions of valve 2 are not here material.

Each sand trap receives sand through connection 6 from a sand box such as the box 7. It delivers sand through throat 8 to pipe 9 which terminates in a distensible self-clearing nozzle 11. The sand does not flow through throat 8 by gravity, but is entrained by an ejector effect when sanding air from pipe 12 and passage 13 is discharged by nozzle 14. The part 10 is the stirring nozzle which is fed by atmospheric air drawn into the trap by the ejector action.

Encircling nozzle 14, and slidable thereon, is sleeve 15 with diaphragm thrust plate 16. The elastic diaphragm 17 is connected at its center to sleeve 15 and at its margin to housing 4. The space above the diaphragm is subject to the pressure in the cleanout pipe 18 and the space below is open to the interior of the trap through filter plug 19.

The lower end of sleeve 15 is connected to elastic tube 21 whose upper end is connected to the body 4 as shown. A spring 22 normally holds the sleeve 15 in its upper position, but when diaphragm 17 is subjected to fluid pressure and forced downward, tube 21 seals throat 8 from the sand chamber in housing 4. At such time cleanout air flows between sleeve 15 and nozzle 14 and acts to blow pipe 9 clear.

The action of the trap is more elaborately described in Patent No. 2,243,242 and is not a feature of the present invention.

When pressure is developed in pipe 5 by the operation of valve 2, it acts beneath diaphragm 23, forces up stem 24 and unseats poppet valve 25. This admits air at supply pressure from a branch of pipe 1, through passage 26 to passage 27 which is in free communication with sanding pipe 12, rendering ejector nozzle 14 at once active.

Practically simultaneously diaphragm 17 is subjected to pressure and forced down, by air delivered from passage 27, through branch 28 past seat 29 to port 31 which communicates with a branch of cleanout pipe 18. This initial cleanout flow is limited in duration by a timing valve. The timing valve comprises the diaphragm 32, which acts as a valve against seat 29, the timing chamber 33, timing choke 34 and loading spring 35 with thrust plate 36.

When pressure rises in passage 27 and branch 28, diaphragm 32 is forced up away from seat 29 because chamber 33 is then at low (atmospheric) pressure. As chamber 33 charges by flow through choke 34, a pressure will be reached at which spring 35 will close diaphragm 32 against seat 29. This ends the initial cleanout flow.

Thus, in the first phase, throat 8 receives no

sand but does receive air at supply pressure from sanding pipe 12 through nozzle 14 and from cleanout pipe 18 through the clearance between nozzle 14 and sleeve 15.

When the cleanout air is cut off, diaphragm 17 rises and sanding starts.

To provide a cleanout cycle immediately after the termination of sanding, a second diaphragm operated valve is provided. This functions in two phases. The first phase is initiated by the rise of pressure in sanding control line 5 and hence in passage 27. The second phase is initiated by the fading of these pressures.

In the first phase, the diaphragm valve acts to accumulate a charge of air. This charge ultimately attains approximately the pressure of supply. The volume accumulated is made such as to supply a cleanout blast of suitable duration to all the traps which it serves. In the second phase, the air so stored is discharged through the cleanout line 18.

The valve mechanism in question is mounted in housing 3 and comprises a differential diaphragm unit made up of the large diaphragm 41, the smaller diaphragm 42, and connecting stem 44. The large diaphragm serves as a motor diaphragm and the smaller diaphragm 42 serves primarily as a valve coacting with the seat 43. Stem 44 has thrust plates 45 embracing the diaphragm 41. The lower end of the stem 44 is connected to the center of the diaphragm 42 by a screw and washer indicated at 46. The space 40 between the diaphragms is in free communication with a storage reservoir 47, of suitable volume, and also is in free communication with the space within valve seat 43, by way of passage 48. The space beneath the lower diaphragm 42 outside valve seat 43 is in free communication with the cleanout pipe 18.

Above the diaphragm 41 is a closed chamber 49 which is in free communication with the passage 27. The space 40 between the diaphragms is in restricted communication with the passage 27 by way of the choke 51 and the ball check valve 52 which opens to permit flow from passage 27 to this space but closes against reverse flow. A spring 53 biases the diaphragm 41 and stem 44 downward so that the small diaphragm 42 normally closes against the seat 43.

In the first phase, that is when sanding pressure is rising and is maintained in passage 27, the chamber 49 immediately charges so that the spring 53 maintains the diaphragm 42 against seat 43. The space 40 between the diaphragms and the storage volume 47 charge more slowly by flow through the choke 51 and valve 52. If sanding continues long enough the volume 47 will charge to the pressure of supply which then is established in the passage 27. In any event, the reservoir 47 will be charged to some extent.

When sanding is to be terminated and valve 25 closes, the pressure in passage 27 rapidly fades out because of flow from this passage through the sanding pipe 12 and nozzle 14. This entails a fall of pressure in the chamber 49. The pressure developed in the storage volume 47 is effective in chamber 40 between the differential diaphragms and acts to move the stem 44 upward carrying the diaphragm 42 away from the seat 43 and permitting the stored compressed air to flow from the storage volume 47 through port 48 past seat 43 to the cleanout pipe 18.

This affords a final cleanout blast which forces the diaphragm 17 of the traps downward to terminate the flow of sand after which the air flow blows the sand pipe 9 clear.

The cycle resembles that secured with the slide valve mechanism described and claimed in the Campbell patent, above identified. It is not quite identical, and for some purposes is inferior. Where simplicity and expense are controlling factors, the operation is sufficiently precise.

The particular form of control valve 2 which may be used is a matter of choice. Basically the function of this valve is to admit air under pressure to pipe 5 and then vent that pipe. Any control valve which secures this result might be substituted.

The two diaphragm valve mechanisms are shown mounted in a single housing together with the pilot control valve 25 and its actuating diaphragm 23.

The pilot valve 25 is desirable when the valve 2 is located at a considerable distance because it permits the use of a small control pipe 5. Where the valve 2 is close to the traps or where the pipe 5 can be made sufficiently large, the valve 25 can be dispensed with.

It is not necessary that the two diaphragm valves be mounted in the same housing. In fact, valves of this type could even be mounted on the housing 4 of the sand trap. Such an arrangement is not ordinarily practicable because there is rarely room for the valves themselves, not to mention the volume 47.

I claim:

1. The combination of a sanding trap having a sanding air connection and a cleanout air connection; an impulse valve rendered effective by development of pressure in the sanding air connection to deliver a timed pressure impulse therefrom to the cleanout air connection; a local reservoir; and a second valve mechanism subject to pressure in the sanding air connection and serving when the sanding connection is under pressure to charge said reservoir therefrom, and serving in response to dissipation of such pressure to connect said reservoir with the cleanout air connection.

2. The combination of a sanding trap having a sanding air connection and a cleanout air connection; a reservoir; and valve means responsive to pressure in the sanding air connection, said valve means comprising, means for charging the reservoir at a restricted rate from the sanding connection, and valve means responsive to falling pressure in the sanding connection and serving to connect said reservoir temporarily with the cleanout connection.

3. The combination of a sanding trap having a sanding air connection and a cleanout air connection; a reservoir; and valve means responsive to pressure in the sanding air connection, said valve means comprising, means for charging the reservoir at a restricted rate from the sanding connection, timing valve means responsive to development of pressure in the sanding connection and serving for a limited period to connect the sanding connection with the cleanout connection, and valve means responsive to falling pressure in the sanding connection and serving to connect said reservoir temporarily with the cleanout connection.

4. The combination of a sanding trap having a sanding air connection and a cleanout air connection; a reservoir; means permitting restricted charging flow from the sanding air connection to the reservoir; and a pressure-motor operated

valve controlling a connection between the reservoir and the cleanout air connection, subject to the pressure differential between the reservoir and the sanding air connection, and arranged to close except when reservoir pressure exceeds sanding air connection pressure.

5. The combination of a sanding trap having a sanding air connection and a cleanout air connection; a reservoir; means permitting restricted charging flow from the sanding air connection to the reservoir; means inhibiting back flow from the reservoir to the sanding connection; and a pressure-motor operated valve controlling a connection between the reservoir and the cleanout air connection, subject to the pressure differential between the reservoir and the sanding air connection, and arranged to close except when reservoir pressure exceeds sanding air connection pressure.

6. The combination of a sanding trap having a sanding air connection and a cleanout air connection; a reservoir; means responsive to the development of pressure in the sanding air connection to deliver air under pressure therefrom to the cleanout air connection; timing means for terminating such delivery; means for charging of the reservoir from the sanding air connection; and means rendered effective by depletion of sanding connection pressure below reservoir pressure to connect the reservoir with the cleanout connection.

7. The combination of a sanding trap having a sanding air connection and a cleanout air connection; a reservoir; means for charging the reservoir from the sanding air connection when the latter is under pressure; a valve controlling a connection between the reservoir and the cleanout air connection; means biasing said valve in a closing direction; and an abutment connected to said valve and subject to the pressure differential between reservoir pressure and pressure in the sanding air connection, the parts being so arranged that the bias on the valve will be overcome when reservoir pressure materially predominates.

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