Dec. 12, 1950 W. V. PAINE 2,533,395

MACHINE AND PROCESS FOR SEPARATING LIQUID FROM SLUDGE

Filed March 22, 1945 2 Sheets-Sheet 1

Fig. 1.

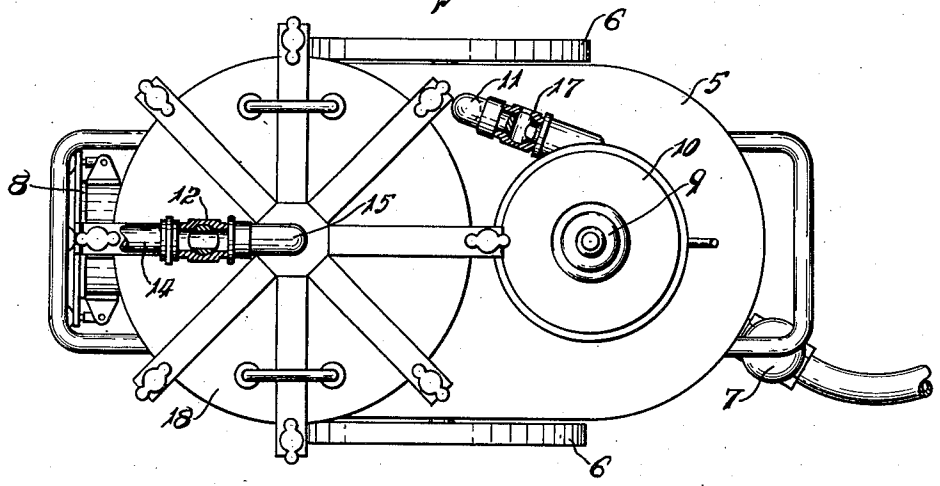
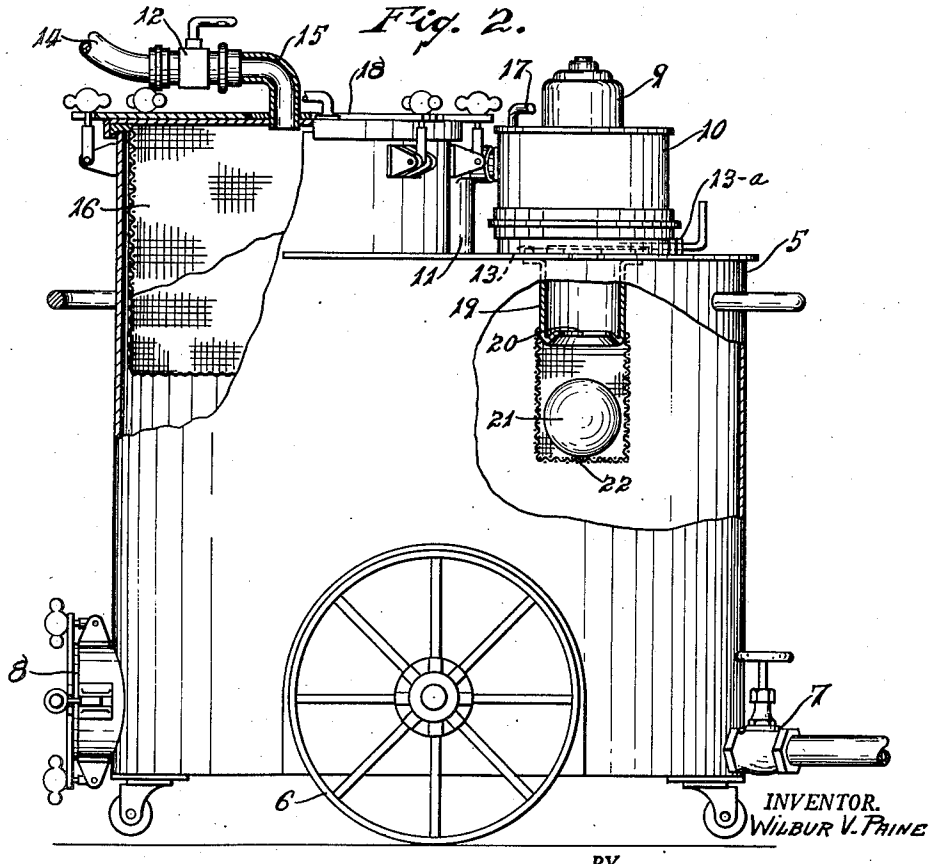


Fig. 2.



INVENTOR.
WILBUR V. PAINE

BY

Louis V. Lucia

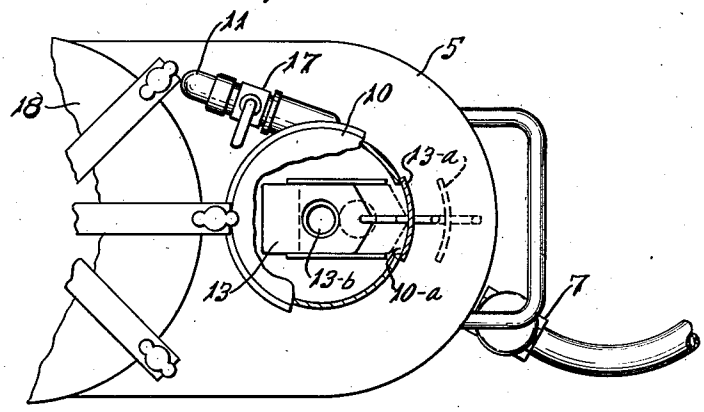
ATTORNEY.

Dec. 12, 1950 W. V. PAINE 2,533,395

MACHINE AND PROCESS FOR SEPARATING LIQUID FROM SLUDGE

Filed March 22, 1945 2 Sheets-Sheet 2

Fig. 3.



INVENTOR.
WILBUR V. PAINE

BY

Louis V. Lucia

ATTORNEY.

Patented Dec. 12, 1950 2,533,395

UNITED STATES PATENT OFFICE

2,533,395

MACHINE AND PROCESS FOR SEPARATING LIQUID FROM SLUDGE

Wilbur V. Paine, East Hartford, Conn., assignor to The Spencer Turbine Company, Hartford, Conn., a corporation of Connecticut

Application March 22, 1945, Serial No. 584,195

3 Claims. (Cl. 222—128)

1

This invention relates more particularly to a process for separating liquid from sludge such as is commonly produced by the operation of metal working machines such as grinding, boring, and other metal cutting machines, and an object of the invention, among others, is the provision of a machine and process by means of which liquid may be quickly separated from the heavier particles comprising the sludge and in a most efficient manner.

One form of an apparatus that has been satisfactorily employed for effecting the purposes set out herein is illustrated in the accompanying drawings, in which—

Fig. 1 is an elevational plan view of my improved apparatus with parts shown in section to illustrate the construction of the machine.

Fig. 2 is a side view of the apparatus with parts broken away to illustrate the construction thereof.

Fig. 3 is a fragmentary plan view of a portion of the machine illustrating the construction of the slide valve.

It is common practice at the present time in the operation of metal working machines, as grinding, planing, or boring machines, to use a liquid, commonly oil, to keep the tools cool and at the same time wash away the cuttings produced by the tools, this accumulating in the form of a sludge in a tank provided in the machine for the purpose. The machine illustrated and described herein is used for the purpose of removing this sludge and the problem now appears to separate the liquid portion of the sludge from the heavier parts. This is done in the use of my invention by using the same apparatus that removes the sludge from the sump in the metal working machine to separate the liquid portion of the sludge from the remainder by subjecting the entire contents thus removed from the machine to a pressure that will remove the liquid portion of the mass while the heavier portions are retained for separate and subsequent removal.

As shown in the drawings, my improved machine may comprise a tank 5, preferably mounted on wheels 6 and having a bottom outlet at one side controlled by a valve 7 and a bottom clean out opening, preferably at the opposite side, which is closed by a suitable cap 8.

A suitable air mover, preferably of conventional form as indicated at 10 and driven by a motor 9, is mounted upon the top of said tank and is connected therewith by means of a tube 11 in which there is provided a suitable two-way

2

valve 17. The said tank has an outlet tube 15 that is controlled by a suitable one-way valve 12 to which a flexible hose 14 may be connected for passing the sludge into the tank 5.

The vacuum producer is connected, with the interior of the tank 5, through an opening 13—*b* in its bottom which is controlled by a slide gate valve 13, and with the atmosphere, through an opening 13*a* in the side thereof which is controlled by a shutter 13—*a* that is movable with the gate valve 13. The opening between the vacuum producer and the tank 5 is also controlled by a float valve comprising a depending tube 19 having a valve seat 20 which receives a float 21 that is contained within a screen 22.

In the top of the tank 5, there is also provided an opening which is closed by a cover 18 and in which there is suspended a suitable filter, preferably in the form of a basket 16, constructed of a suitable perforate material.

The operation of my improved machine is as follows:

When it is desired to draw sludge from a sump, container, or the like, the slide valve 13 is opened and the shutter 13—*a* is moved to closed position, the two-way valve 17 is opened to the atmosphere, and the one-way valve 12 is positioned so that the hose 14 communicates with the tank 5 through the tube 15. The air mover may now be started in operation by connecting it to a suitable electric supply for energization of the motor 9. This will cause air to be drawn into the tank through the tube 14, upwardly through the float valve and out through the two-way valve 17 to atmosphere and thereby produce a partial vacuum in the tank 5. Upon inserting the end of the hose 14 into the sludge which is to be treated, the said sludge will be drawn through the hose and the tube 15 into the filter basket 16 and the heavier material in the sludge will remain in this basket while the liquid therein, such as the oil or the like, will pass through the basket and be collected in the tank 5. When the liquid in said tank rises to level just below the basket 16, the float 21 will rise and press against the valve seat 20; thereby closing the float valve and disconnecting the vacuum producer from the tank so as to eliminate the partial vacuum therein and stop the suction of further sludge into the tank.

When the liquid is to be removed from the tank 5, the slide valve 13 is closed and the shutter 13—*a* is opened as shown in dotted lines in Fig. 3, the two-way valve 17 is positioned so that the pressure producer 10 communicates

with the tank 5 through the tube 11, and the one-way valve 12 is closed. Operation of the pressure producer will now draw air through the opening in the side which is controlled by the shutter 13—*a* and force said air through the tube 11 into the tank and thereby create a pressure in said tank so that, upon opening of the valve 7, the liquid in the tank will be forced outwardly through the hose 23 and delivered to the position desired.

When the basket 16 is to be emptied, the cover 18 may be removed and the basket lifted out. The cap 9 is removed when it may be desired to clean the bottom of the tank 5.

It will thus be seen from this description that the vacuum created by the vacuum producer is made use of to cause the sludge from the sump in the machine tool to be drawn into the tank 5, and then by manipulating the valves the vacuum producer is employed to create a pressure in the tank 5, thereby enabling the liquid contents of said tank to be drawn off and thereafter the heavier particles of the sludge may be removed in the manner above set out, said liquid contents being forced out through the hose 23.

While the valve 13 is illustrated herein as a slide valve I contemplate that a valve of any sort to accomplish the purpose may be employed. Further, the valve 20 shown in Fig. 2 is illustrated as a self-closing valve, but any valve suitable for controlling conditions within the tank may be employed at this location.

I claim:

1. A machine of the character described comprising a portable tank, a valve controlled outlet at the lower end of the tank, a motor driven air mover mounted on the top of the tank and in communication with the tank, means controlling communication between the air mover and tank, a valve controlled suction pipe connected to the top wall of the tank, a pipe connecting the air mover to the top wall of the tank, a valve in said pipe open to atmosphere in one position and forming closed communication between the air mover and tank in another position, and all of said valves when in one position being operative to produce a partial vacuum in said tank for drawing material into the tank through said suction pipe and when in another position to create pressure in said tank for forcing material out of the tank.

2. A machine of the character described comprising a portable tank, a valve controlled outlet at the lower end of the tank, a motor driven air mover mounted on the top of the tank and in communication with the tank, means controlling communication between the air mover and tank,

a valve controlled suction pipe connected to the top wall of the tank, a pipe connecting the air mover to the top wall of the tank, a valve in said pipe open to atmosphere in one position and forming closed communication between the air mover and tank in another position, a valve controlled opening in the air mover for selectively placing the air mover in communication with the atmosphere, and all of said valves when in one position being operative to produce a partial vacuum in said tank for drawing material into the tank through said suction pipe and when in another position to create pressure in said tank for forcing material out of the tank.

3. A machine of the character described comprising a portable tank, a valve controlled outlet at the lower end of the tank, a motor driven air mover mounted on the top of the tank and in communication with the tank, means controlling communication between the air mover and tank, a valve controlled suction pipe connected to the top wall of the tank, a pipe connecting the air mover to the top wall of the tank, a valve in said pipe open to atmosphere in one position and forming closed communication between the air mover and tank in another position, said air mover having an opening therein to atmosphere, a closure for said opening operated by the means controlling communication between the air mover and tank, and all of said valves when in one position being operative to produce a partial vacuum in said tank for drawing material into the tank through said suction pipe and when in another position to create pressure in said tank for forcing material out of the tank.

WILBUR V. PAINE.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
Re. 21,741	Samiran	Mar. 4, 1941
361,474	Weygant	Apr. 19, 1887
745,519	Pravicha et al.	Dec. 1, 1903
924,524	Zerkowitz	June 8, 1909
1,166,713	Otterson	Jan. 4, 1916
1,207,679	Boylan	Dec. 5, 1916
1,344,710	Otterson	June 29, 1920
1,419,478	Thompson et al.	June 13, 1922
1,650,478	Wimberley	Nov. 22, 1927
1,681,002	Londagin	Aug. 14, 1928
1,714,300	Denny	May 21, 1929
1,836,029	Hutt	Dec. 15, 1931
1,892,519	Schottgen	Dec. 27, 1932
1,926,512	Buchet	Sept. 12, 1933