W. E. PLAYTER.

APPARATUS FOR COLLECTING SOLIDS SUSPENDED IN GASES.

APPLICATION FILED FEB. 19, 1914.

1,118,045.

Patented Nov. 24, 1914.

2 SHEETS—SHEET 1.

Fig. 1.

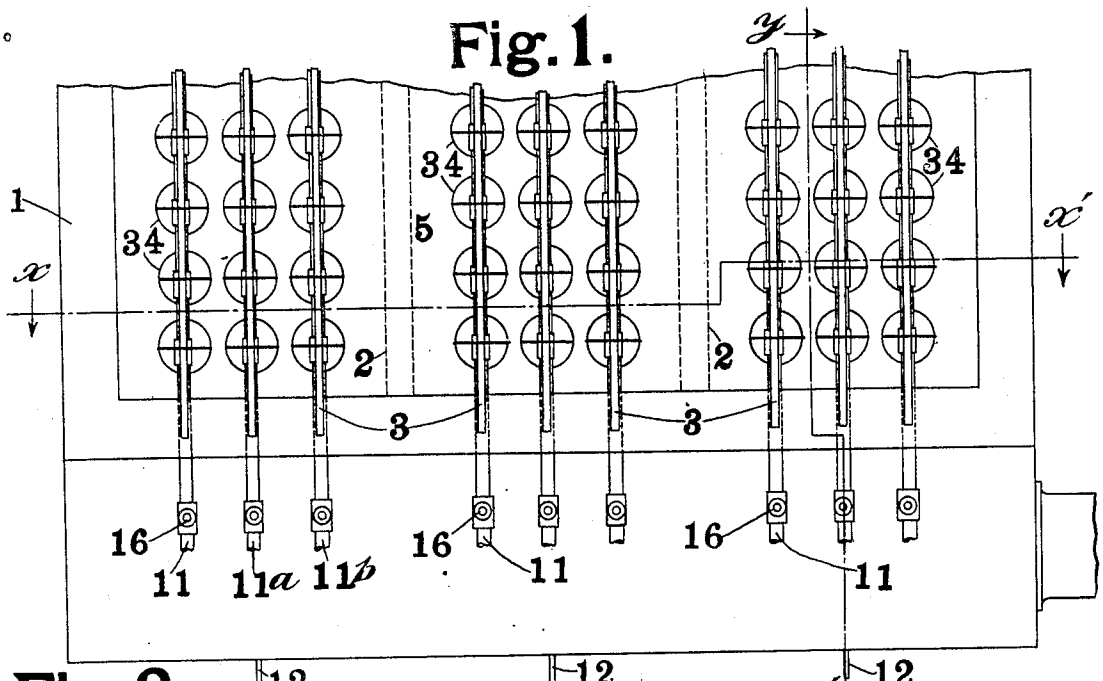
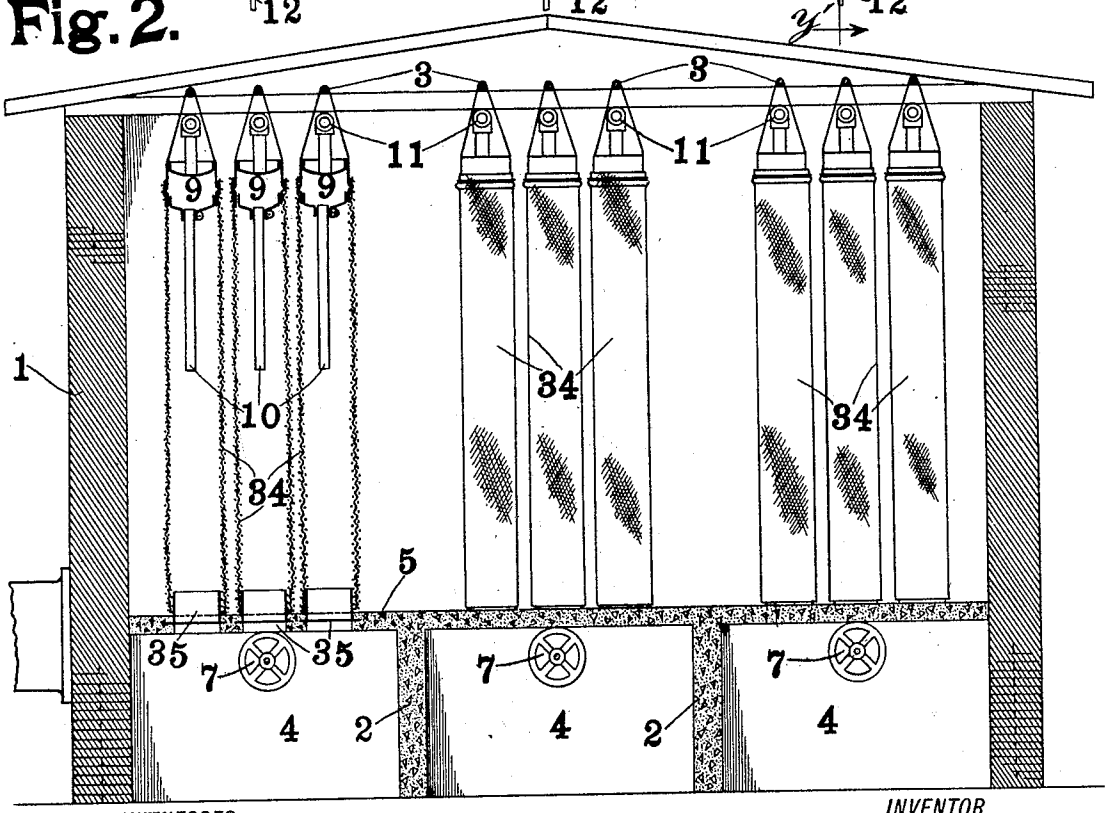


Fig. 2.



WITNESSES:

Chas. A. Becker.

G. M. Shorr

INVENTOR

Willard E. Playter,

BY

E. E. Huffman

ATTORNEY

W. E. PLAYTER.

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2 SHEETS—SHEET 2.

Fig. 3.

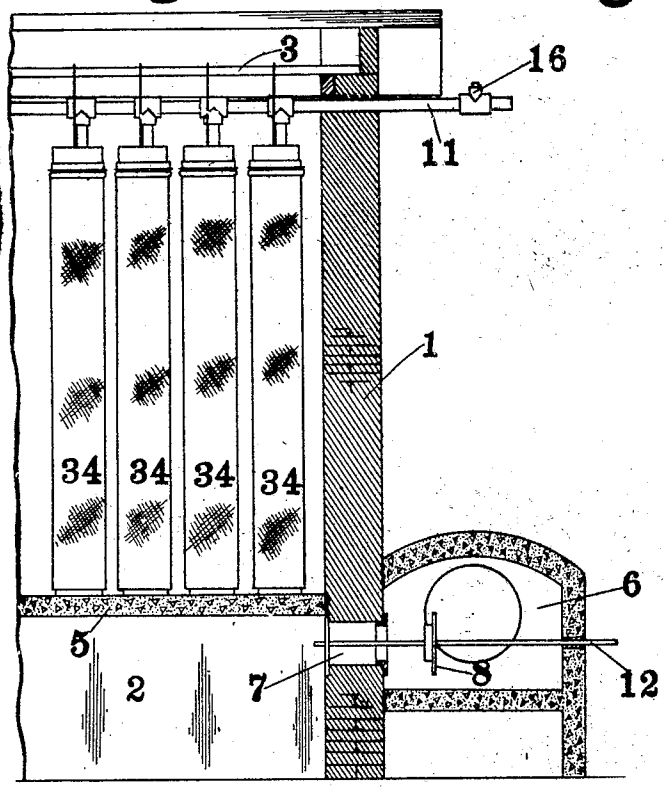


Fig. 5.

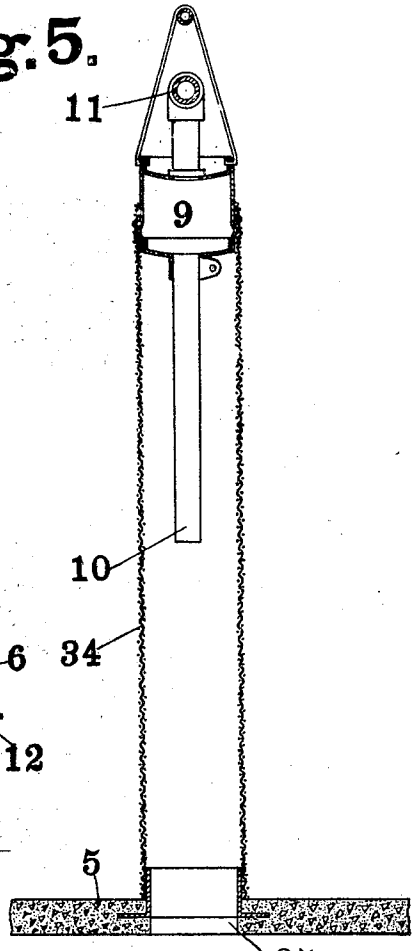
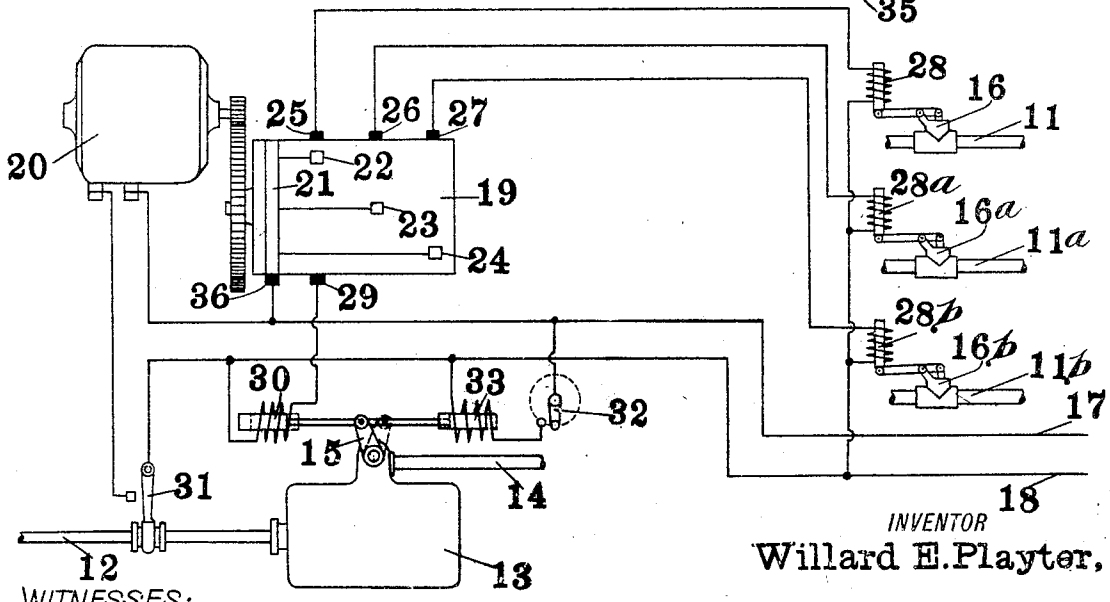


Fig. 4.



WITNESSES:

Chas. A. Becker,

G. M. Thorn

INVENTOR

Willard E. Playter,

BY

E. E. Huffman

ATTORNEY

UNITED STATES PATENT OFFICE.

WILLARD E. PLAYTER, OF COLLINSVILLE, ILLINOIS.

APPARATUS FOR COLLECTING SOLIDS SUSPENDED IN GASES.

1,118,045. Specification of Letters Patent. Patented Nov. 24, 1914.

Application filed February 19, 1914. Serial No. 819,819.

To all whom it may concern:

Be it known that I, WILLARD E. PLAYTER, a citizen of the United States of America, residing at Collinsville, Madison county, State of Illinois, have invented a certain new and useful Apparatus for Collecting Solids Suspended in Gases, of which the following is such a full, clear, and exact description as will enable any one skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to apparatus for collecting solids suspended in gases, and, particularly, to apparatus for collecting the valuable ore that is carried in suspension by the gas from smelting furnaces. Gases from lead smelting furnaces, for example, carry a considerable quantity of lead oxid and are, ordinarily, passed through walls of suspended bags before being carried to the chimneys. The fabric of the bags collects the oxids and other suspended material and the bags must be frequently shaken to remove the collected material and to keep the interstices from becoming so completely filled as to prevent the passage of the gas through the bags. The shaking of the bags is now done by hand and the operation is very slow and expensive and very injurious to the health of the workmen.

It is the object of my invention to provide apparatus for keeping the bags clean which will be simple in construction and rapid in operation, will render it unnecessary for workmen to enter the bag house, and will increase the efficiency and capacity of a given number of bags.

A further object is to provide an apparatus in which the various operations will be carried out in proper sequence without attention or care of an operator.

Other objects and advantages will appear from the more detailed description.

Briefly stated, my invention consists of pneumatically operated means for shaking the bags, dampers for controlling the supply of gas to be strained, and electrical apparatus for controlling the bag shaking means and the gas controlling dampers.

In the accompanying drawings, which illustrate one embodiment of my invention, Figure 1 is a plan view of a portion of the bag house; Fig. 2 is a vertical view on the line x—x' of Fig. 1; Fig. 3 is a vertical view on the line y—y' of Fig. 1; Fig. 4 is a diagrammatic view, showing the electrical controlling apparatus; Fig. 5 is a vertical cross section of one of the bags, showing the bag shaking apparatus.

1 represents a bag house. The portion below the main floor 5 is divided into compartments or "cellars" by the partitions 2. Any desired number of these compartments may be provided. A plurality of bars 34 are suspended from rods 3 and have their lower ends in communication with a cellar 4. A main conduit 6 from the furnace communicates with each of the cellars 4 through the openings 7 controlled by dampers 8. Suspended from and communicating with the small reservoirs 9 are flexible tubes 10 which extend a substantial distance downward in the interior of the bags. The reservoirs 9 for each series of bags are connected to air supply pipes 11 which are each in communication with a source of compressed air (not shown). Damper rods 12 are connected to the piston of air cylinder 13 supplied by pipe 14, separate cylinders being provided for operating each damper rod. The valve 15 controls the admission of air into the cylinder. In the position shown in full lines in Fig. 4, it admits the air to one side of the piston head and, in the position shown in dotted lines, to the other side of the piston head. Each supply pipe 11 is provided with a valve 16. These valves 16 and the valve 15 are operated by electrical apparatus which will now be described.

17, 18 represent current supply means, 19 is a drum controller driven by the motor 20. The controller is provided with a continuous contact band 21 to which are connected contact members 22, 23 and 24. These contacts 22, 23 and 24 coöperate with brushes 25, 26 and 27 respectively and each of these brushes is in circuit with a solenoid 28 controlling a valve 16. The contact 22 also coöperates with a brush 29 in circuit with a solenoid 30 which constitutes part of the operating means for valve 15 of the air cylinder 13.

31 is a switch movable with the damper rod 12 and adapted to connect and disconnect the motor 20 from the mains 17, 18.

32 is a clock driven switch in circuit with the mains 17, 18 through the solenoid 33 which, together with the solenoid 30, constitutes the means for operating the valve 15.

In the operation of the bag house, gases

from the smelting furnace are brought through the conduit 6 and openings 7 into the cellars 4 and through the openings 35 into and through the walls of the bags and out through suitable flues (not shown) in the bag house. At a predetermined time, the switch 32, which I prefer to operate by clockwork, closes the circuit through solenoid 33 and thus causes the valve 15 to be brought to the position shown in dotted lines in Fig. 4, and air, under pressure, is thereby admitted to the air cylinder to close the damper 12 in one of the compartments, thereby cutting off the supply of gas to the bags communicating with that compartment. The movement of the damper rod 12 to close the damper also closes the switch 31 and the motor 20 is thereby connected to the line and drives the controller 19 to bring the contact piece 22 into contact with the brush 25 and thereby closes the circuit through the solenoid 28 to open the valve 16, this circuit being traceable as follows: from main 17 to brush 36, contact member 21, contact 22, brush 25 and solenoid 28 to main 18. The controller drum moves slowly and this circuit will be maintained for a few seconds during which time the valve 16 is held open and compressed air admitted to the series of reservoirs 9 connected to the pipe 11. The air passes from these reservoirs through the tubes 10 and the ends of these tubes being free, it causes them to vibrate with considerable violence and strike the walls of the bags, thus loosening the collected material therefrom and this material, under the influence of gravity and the downward current of air, falls through the openings 35 into the cellar 4. As soon as the contact piece 22 passes out of contact with the brush 25, the valve 15 is closed. Further movement of the controller brings the contact 23 into contact with a brush 26 whereby valve 16_a in the air pipe 11_a for supplying the adjacent series of bags is opened by the solenoid 28_a and the operation just described repeated. Still further movement of the controller causes the solenoid 28_b to open the valve 16_b in pipe 11_b controlling the air to the third series of bags. After contact piece 24 has passed out of circuit with brush 27, contact 22 comes into contact with brush 29 and thereby closes the circuit through solenoid 30 which actuates the valve 15 to admit air to the opposite side of the piston head in cylinder 13 and causes the damper 8 to be opened, at the same time, opening the switch 31 and thereby stopping the motor 20. The drum 19 is moved to sufficient extent to separate contact 21 and brush 29 before the motor stops. When switch 32 again reaches its contacting position, the series of operations just described is repeated, and this switch is so timed that the bags connecting with the compartment controlled by it and the associated apparatus will be shaken at the proper intervals to utilize them most efficiently.

It will be apparent that the bags communicating with a given compartment need be out of service, that is to say gas from the furnace cut off from them, only a very short time and, for this reason, their all-day efficiency is high, and the same quantity of gas can be strained with fewer bags than in a system where the shaking of the bags must be done by the slow methods now in use. Each compartment or cellar of the bag house is preferably provided with the damper and beater controlling apparatus described, and the switches 32 so timed that only one compartment of the bag house is, at any given time, out of service for the shaking of the bags communicating with it.

The purpose of the air reservoir 9 is to supply currents of air to the interior of the bags for a short time after the valves in the air supply pipes have been closed and vibration of the beaters 10 has ceased. These relatively slow moving currents of air in the bag carry the residue of the loosened material downward into the cellar 4.

Having fully described my invention what I claim as new and desire to secure by Letters-Patent of the United States is:

1. In an apparatus of the class described, the combination of a bag or container pervious to gas, means for forcing gas to be strained through said bag, a flexible tube supported adjacent to the bag, and pneumatic means for causing said tube to strike the bag to dislodge the collected material therefrom.

2. In an apparatus of the class described, the combination of a bag or container pervious to gas, means for forcing the gas to be strained through said bag, a flexible, hollow beater supported adjacent to the bag, and means for supplying air or other gas to the interior of the bag through the beater.

3. In apparatus of the class described, the combination of collecting bags or containers pervious to gas, means for conveying gas to be strained to said bags, means for shaking the bags to separate the collected material therefrom, means for controlling the shaking means and the flow of gas to the bags, said controlling means being adapted to cut off the supply of gas before causing the shaking means to operate, and means for supplying currents of air or other gas to the interior of the bags while the supply of gas to be strained is cut off.

4. In an apparatus of the class described, the combination of a bag or container pervious to gas, means for forcing gas to be strained through said bag, a flexible tube supported adjacent to the bag, means for supplying air or other fluid under pressure