H. F. SMITH.

CONVEYER.

APPLICATION FILED SEPT. 12, 1917.

1,335,205. Patented Mar. 30, 1920.

2 SHEETS—SHEET 1.

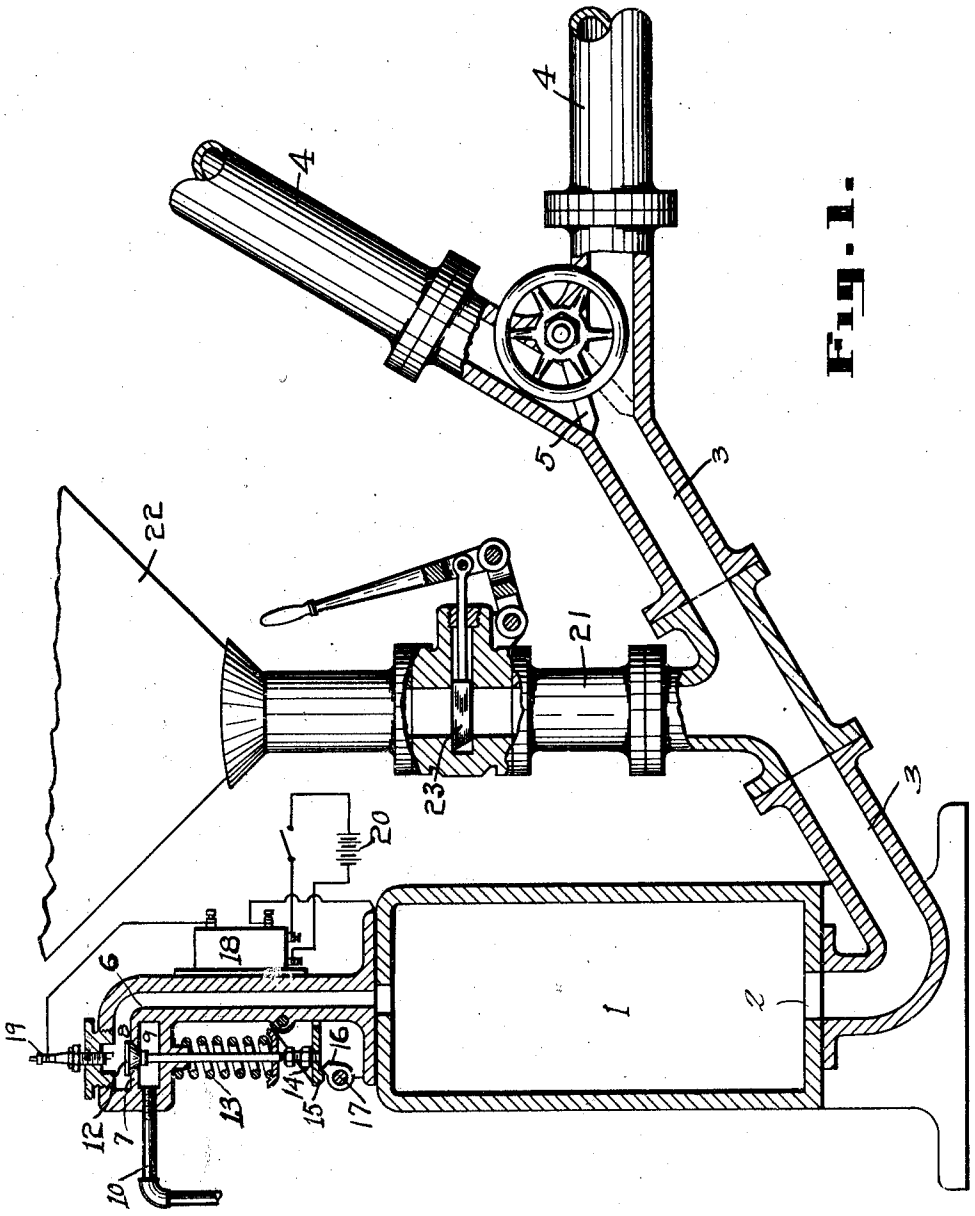


Fig. 1.

Witnesses.
Edwin James.

Inventor.
Harry F. Smith
By Kerr, Page, Cooper & Hayward.
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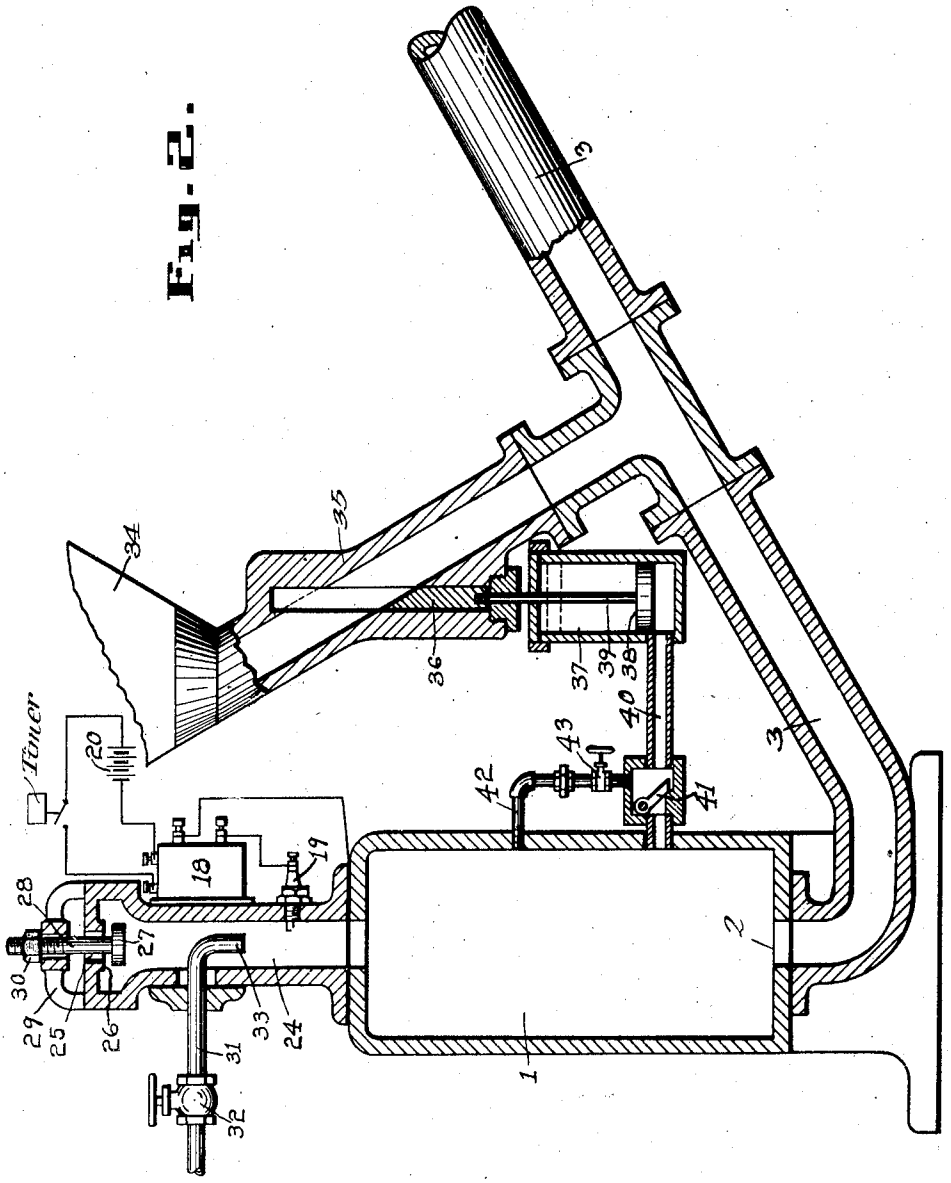
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2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

HARRY F. SMITH, OF LEXINGTON, OHIO, ASSIGNOR TO THE SMITH GAS ENGINEERING COMPANY, A CORPORATION OF OHIO.

CONVEYER.

1,335,205. Specification of Letters Patent. Patented Mar. 30, 1920.

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To all whom it may concern:

Be it known that I, HARRY F. SMITH, a citizen of the United States of America, residing at Lexington, Richland county, Ohio, have invented certain new and useful Improvements in Conveyers, of which the following is a full, clear, and exact description.

This invention relates to conveying apparatus, and the object thereof is to provide an improved and efficient conveying or distributing mechanism for coal or similar material which will decrease the initial cost of installing such mechanism, and will also greatly decrease the regular operating expenses thereof.

All forms of conveying apparatus heretofore used have comprised expensive installations, the expense being largely due to the operating mechanism for hoisting or forcing the material through the conveying troughs or pipes. In my invention I eliminate this expensive and complicated operating mechanism without in any way detracting from the effectiveness of my apparatus.

In carrying my invention into effect I make use of operating mechanism such as shown, in the accompanying drawings in which:—

Figure 1 is a view partly in section of one form of my invention, and

Fig. 2 is a similar view of a modified form thereof.

In that form of my apparatus illustrated in Fig. 1, 1 is an explosion chamber having an outlet opening 2 in the lower end thereof connected to the pipe 3, which acts as both a receiving and distributing pipe. This pipe is adapted for conveying, to any desired place of use or storage, fuel or analogous material, and may be divided into any desired number of branches as 4—4, having a deflecting vane 5 for directing the conveyed material into any branch desired, or, by proper positioning, into several branches at the same time.

Extending upwardly from the top of the chamber 1, is an inlet tube 6, the upper end of which is provided with a partition 7, dividing that part of the tube into two chambers 8 and 9. The chamber 8 is in unobstructed communication with the inside of chamber 1, while the chamber 9 has opening thereinto a pipe 10 connected to any suitable source for supplying an explosive mixture. The partition 7 has a valve port therein, connecting the two chambers 8 and 9, controlled by a valve 12, normally held on its seat by a spring 13. Pivotally attached to tube 6 is a yoke 14, the upper face of which is adapted to coöperate with the lower end of the stem of the valve 12 to raise that valve from its seat, and thus open communication between chambers 8 and 9. The lower face of yoke 14 bears thereon a cam 15 adapted to coöperate with a cam 16 borne by the revoluble shaft 17, whereby rotation of the shaft 17 will insure opening of the valve. Rotation of this shaft 17 may be brought about in any desired manner to open valve 12 at such intervals and for such length of time as may be necessary to bring about the desired operating conditions. Attached to the inlet tube 6 or any other convenient part of the explosion chamber or apparatus, is a conventional vibrator coil 18 connected to a spark plug 19, set into the upper wall of chamber 8 so that a suitable spark may be obtained for igniting the explosive mixture therein and in the chamber 1. Properly connected to the vibrator coil is a battery 20. Obviously any other suitable source of current may be connected with the coil 18 in place of the battery 20.

Leading into the delivery or distributing pipe 3 is a supply pipe 21 which is connected to the supply of material to be distributed or conveyed by the apparatus. As shown, the supply pipe 21, leads from a coal hopper 22, a manually operated gate valve 23 being inserted in such pipe 21 so that the flow of material from the hopper 22 to the pipe 3, may be controlled as desired. This valve 23 also serves another function in that when in closed position it prevents a dissipation therethrough of any part of the explosive effect resulting from ignition of the explosive mixture in chamber 1.

In operating this device the valve 23 is opened to allow the material from the hopper 22 to flow into the delivery pipe 3. At the same time the cam 16 is positioned to open the valve 12, and thus allow an explosive mixture to pass from the pipe 10 into the explosion chamber 1. The desired quantity of explosive mixture having been thus introduced, a spark is passed between the terminals of the spark plug 19, igniting the explosive mixture in the tube 6 and chamber 1. By this time the valve 12 will have been seated, and the only outlet for the explosive

force will be through the outlet opening 2. The full force of the explosion, therefore, acts on the material within the delivery pipe 3, and shoots or drives that material through the conveying pipe and any of the branches 4, to any desired place of use or storage. Before the mixture in the chamber 1 is ignited, the valve 23 is closed so that, as stated above, there will be no dissipation of the explosive energy through the pipe 21.

In Fig. 2 I have shown a different modification of my invention. In this modification the explosion chamber 1, has the outlet opening 2 thereof connected to a conveying or distributing pipe 3, in the same manner as shown in Fig. 1. Attached to the upper end of the explosion chamber 1, is an inlet tube 24, having an inlet port 25 in the top end thereof, which port has its inner end surrounded by a valve seat 26. Mounted in the inlet tube 24 is a valve 27 which coöperates with the seat 26 to control the port 25. The stem 28 of the valve extends outwardly through the valve port and passes through a spider 29. Adjustably mounted on the stem 28 is a stop 30, adapted to cooperate with the spider 29, to limit downward movement of the valve. This valve 27 is adapted to open and remain open under normal conditions due to the action of gravity. Leading into the inlet tube 24 is a pipe 31 connected to any desired source of explosive gas or vapor. Mounted in the pipe 31 is a valve 32 whereby the supply of gas or vapor through the pipe 31 may be limited as desired. The gas or vapor supplied through the pipe 31 is under pressure, and the end of this pipe extending into the tube 24 is bent, so that it opens downwardly as shown at 33. It is evident that, with this structure, when gas under pressure is delivered through the bent end 33 of the pipe 31, such end 33 acts as a nozzle and constitutes with the tube 24 what is in effect an injector. Since the valve 27 is normally open under the action of gravity, there may be a free flow of air therethrough into the tube 24, the amount of air passing through the valve port 25 being dependent upon and proportional to the flow of gas through the nozzle 33. By this arrangement a definite proportion of gas and air is insured at all times, and an explosive mixture of the desired constituency is therefore always introduced into the chamber. Of course the rate of flow of such mixture into the chamber 1 is dependent entirely upon the rate of flow of gas through the valve 32, and the length of time necessary in charging the chamber 1 may therefore be varied as desired by properly manipulating that valve. Attached to the explosive chamber in any desired place, is a vibrator coil 18. Inserted through the wall of the tube 24 is a spark plug 19 suitably connected to the vibrator coil 18. Also suitably connected to the vibrator coil 18 is any desired source of current 20. This part of the structure is identical with the ignition mechanism illustrated in Fig. 1.

Leading into the distributing pipe 3 from the storage hopper 34, is a pipe 35, having a gate valve 36 adapted to control the passage of the material from said hopper therethrough. Suitably mounted below the valve 36 is a cylinder 37, having a piston 38 therein connected to the lower end of the stem 39 of valve 36. Opening into the lower end of the cylinder 37 and below the piston 38, is a pipe 40, the other end of which opens into the explosion chamber 1. Mounted in the pipe 40 is a check valve 41, and leading from the pipe 40 between the check valve and the cylinder 37, is a pipe 42, having mounted therein a leak valve 43. Upon explosion of the mixture in the chamber 1, a part of this explosive effect will act through the pipe 40 to force upwardly the piston 38 and the valve connected thereto to shut off the passage through the pipe 35. The check valve 41 is so mounted as to permit of free passage from the chamber 1 into the cylinder 37, but to prevent return passage therethrough. The pipe 42 is adapted to permit leakage therethrough of the pressure in the cylinder 37, the valve 43 being capable of adjustment to vary the rate of such leakage. The valve 36 and the piston 38 are so arranged that when the pressure in the cylinder 37 is sufficiently low, the valve 36 will open through the action of gravity. After this valve has been closed by an explosion in the chamber 1 it will not again open therefore until the leakage through the valve 43 and pipe 42 has sufficiently lowered the pressure in the cylinder 37 to allow it to thus drop open.

In this apparatus as soon as an explosion takes place in chamber 1, such explosion will act upon the piston 38, and force the valve 36 into closed position. With the valve 36 in closed position, it is evident that, as in the modification shown in Fig. 1, the full effect of the explosion in chamber 1 will be exerted on the material within the delivery or distributing pipe 3, and such material will be driven through the pipe, and any branches thereof, to any desired place of use or storage. In this modification as in the modification shown in Fig. 1, the amount of material which may be conveyed is, of course, entirely dependent upon the explosive effect in the chamber 1, and it is therefore obvious that in order to increase the quantity of material conveyed or the distance to which it is conveyed it is merely necessary to increase the size of chamber 1.

If desired a timer may be inserted in connection with the ignition apparatus of Fig. 2, and in this way the action of such hoisting or conveying mechanism made completely

automatic. For the valve 43 may be so set that the valve 36 will open to let a new supply of material into the pipe 3, while a new supply of explosive mixture is being introduced into the chamber 1. In other words it is merely necessary to so correlate the action of the timer for the ignition mechanism and the rate of leakage through the pipe 42 that a new supply of material to be conveyed will be introduced into the delivery pipe 3 by such time as a new explosive mixture is introduced into chamber 1 and there exploded.

While I have illustrated two embodiments of my device, each of which is thoroughly practicable and effective, and which constitute what I consider at present the best embodiments of my invention, I expressly disclaim any limitation of my invention to the exact structural details disclosed, for it is quite evident that numerous mechanical modifications can be made without in any way altering the spirit of the invention. And for a true definition of the scope of my invention, reference should be had to the appended claims.

What I claim as new and desire to secure by Letters Patent is:—

1. In a conveying system comprising a distributing pipe and means for normally supplying to said pipe material to be distributed; an explosion chamber separate from said distributing pipe, and an unobstructed outlet from said chamber into said pipe.

2. In a conveying system comprising a distributing pipe and means for normally supplying to said pipe material to be distributed; an explosion chamber, an outlet therefrom opening into said pipe; means for igniting an explosive mixture within the chamber; the apparatus being so arranged that the force of the explosion acts through the outlet opening directly upon the material within the pipe.

3. A conveyer system of the character described, comprising, in combination, a distributing pipe, means for admitting into said pipe the material to be distributed, said means being adapted to normally admit material to the pipe; an explosion chamber, having an unobstructed opening into said distributing pipe; means for admitting an explosive mixture to said chamber; and means for igniting the mixture within the chamber; the chamber, distributing pipe and material admitting means being so constructed that the explosive force acts directly upon the material in the pipe to force it therethrough and also acts upon the material admitting means to cut off passage through such admitting means.

4. In a conveying system having a distributing pipe, means for supplying to said pipe material to be conveyed; an explosion chamber having an unobstructed outlet therefrom opening into the distributing pipe, an inlet for introducing an explosive mixture into the chamber, means for igniting such mixture; and means operated by the explosion in the chamber for shutting off the supply of material to the distributing pipe.

5. In a conveying system having a distributing pipe, means for supplying to said pipe material to be conveyed, an explosion chamber having an outlet therefrom opening into the distributing pipe, an inlet for introducing an explosive mixture into the chamber, means for exploding such mixture, the apparatus being so arranged that the force of the explosion acts through the outlet opening upon the material within the distributing pipe, and means operated by the explosion in the chamber for shutting off the supply of material to the distributing pipe.

6. In a conveying system having a distributing pipe, means for supplying to said pipe material to be conveyed, a gravity opening valve for controlling the supply of material to said pipe, an explosion chamber having an outlet therefrom opening into the distributing pipe, an inlet in the explosion chamber for introducing an explosive mixture thereinto, means for exploding such mixture, and means operated by the explosion in the chamber for closing said gravity opening valve.

7. In a conveying system having a distributing pipe, means for supplying to said pipe material to be conveyed, valve means controlling the supply of such material and adapted to normally permit the passage of material therethrough, an explosion chamber having an outlet therefrom opening into said distributing pipe, means for supplying an explosive mixture to said chamber, means for detonating said mixture, said means for supplying said explosive mixture and means for controlling the supply of material to the distributing pipe being so arranged that both the explosion chamber and distributing pipe will become charged at the same time.

8. In a conveying system having a distributing pipe; means for supplying to said pipe material to be conveyed; an explosion chamber having an outlet opening into said pipe, an inlet into said explosion chamber; a fuel supply pipe leading into said inlet and at all times open during operation of the device; an air port leading into said inlet, adapted to normally remain open and to automatically close upon the explosion of an explosive mixture in the chamber.

9. A conveyer system of the character described, comprising, in combination, a distributing pipe; an explosion-chamber having an unobstructed outlet into said distributing pipe, means for admitting an ex-

plosive mixture into the chamber, and means for igniting the explosive mixture within the chamber; an admission pipe opening into the distributing pipe, adjacent the outlet of the explosion chamber, and adapted to permit the passage of material to be distributed into said distributing pipe, a valve controlling said admission pipe and normally held open under the action of gravity; pressure operated means adapted to force said valve into closed position, and means operatively connecting the pressure operated means to the interior of the explosion chamber; the apparatus being so constructed that the explosive effect resulting from igniting the mixture within the chamber is adapted to simultaneously force the material through the distributing pipe and force the said valve into closed position.

In testimony whereof I affix my signature.

HARRY F. SMITH.