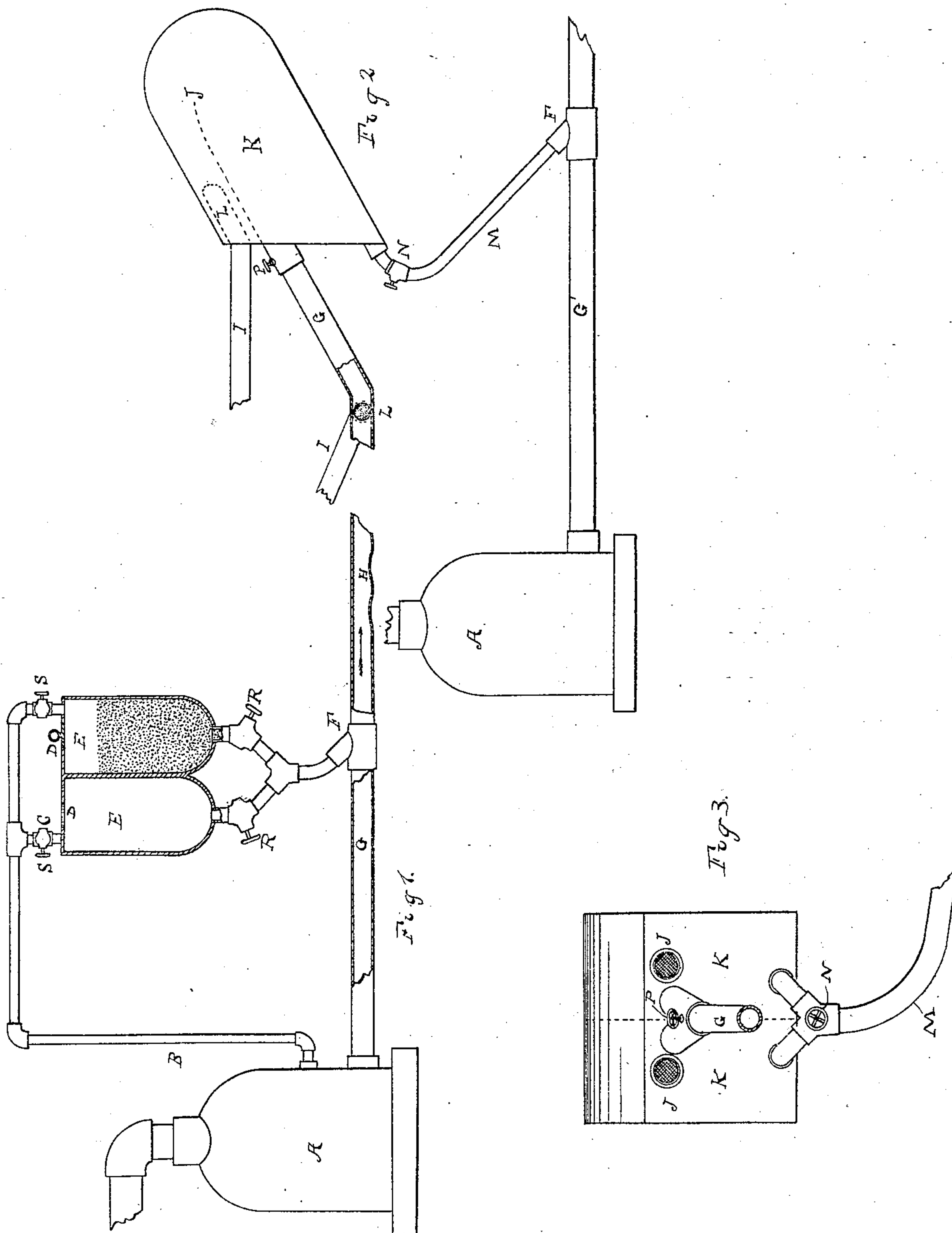


(No Model.)

J. W. BEACH.
PNEUMATIC CONVEYER.

No. 267,318.

Patented Nov. 14, 1882.



WITNESSES

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PNEUMATIC CONVEYER.

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To all whom it may concern:

Be it known that I, JAMES W. BEACH, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Pneumatic Conveyer, of which the following is a specification.

My invention relates to pneumatic transportation; and the objects of my improvement are to provide a continuous current of air passing through a tube, pipe, or box at great velocity, into which current of moving air the article or matter to be transported or conveyed is, in limited quantities, continuously projected or impelled, and also to transmit such article or matter through the tube while in a state of suspension in the air in the tube, and without contact with the sides or bottom of the tube. I attain these objects by the mechanism illustrated in the accompanying drawings.

Figure 1 is a vertical section of a part of the entire machine or apparatus. Fig. 2 is a vertical section of a part of the machine, being the exhaust apparatus, receiver, and discharge and "helper;" Figs. 1 and 2, a vertical section of the entire machine. Fig. 3 is a vertical section of the receivers, switch, and discharge apparatus.

Similar letters refer to similar parts throughout the several views.

A is a reservoir filled with air either by free communication with the surrounding atmosphere at its natural pressure or with air condensed to any degree of elasticity required and kept at a constant equal pressure.

G is a pipe, tube, or box, an open end of which is inserted in the reservoir A, so as to receive the air from the reservoir.

E E are bins or receptacles, into which the articles or commodity to be transported is run or placed through the opening and valve D.

R R are valves or switches, so arranged as to allow communication with one of the bins or receptacles and the pipe G to be cut off while the other bin is being filled.

B is a pipe leading from the reservoir to the bins communicating therewith, and subject to be closed by the valves s s.

F is a pipe communicating between the bins E E and the pipe G. The foregoing is included in Fig. 1.

I I, Fig. 2, are exhaust-pipes having their inner ends inclosed or covered (protected) with suitable bars, slats, or screens.

J is a continuation (curved) of the upper half only of the pipe G, projecting into the receiver K.

K K are two receivers, into one of which the commodity in course of transportation is received, from which receiver the air is to be exhausted, or kept as nearly exhausted as is practicable, through the exhaust-pipes by means of suitable exhaust apparatus.

P is a valve or switch by means of which communication between the pipe G and one of the receivers is cut off, and at the same time such communication with the other receiver is opened.

N is a switch or valve by means of which communication between one of the receivers and the pipe M is cut off, and at the same time communication between the other receiver and said pipe is established.

M is a pipe for the common use of the two receivers, and communicating between the pipe G and the two receivers through the switch or valve N.

I I, Fig. 3, are respectively exhaust-pipes, with screens.

P is a switch or valve; K K, receivers; N, a valve or switch.

M is a discharge-pipe leading to helper, by means of which "helper," so-called, a new impetus is given to the article or commodity to be transported.

H, Fig. 1, is the wavy or undulating interior of the pipe G, at a distance from the point F, and made by suitable indentations or elevations, or both, of the surface of the pipe, so as to constitute on the interior of the same a wavy or undulating surface; or may be wholly inside of the pipe, the object being to create an upward current or trend to the air as it rushes through the tube over the undulating or through the undulating interior surface thereof.

The manner of constructing and operating the machine and apparatus may be briefly described as follows:

A strong air-tight reservoir, A, Fig. 1, is constructed at one end of the pipe G. At the other end of the same pipe one or more strong air-

tight receptacles or receivers are constructed. Communicating between the reservoir and receivers is a pipe, G, or tube, air-tight, or nearly so, with the bottom of the interior thereof at a point distant from the point F, Fig. 1, and between said point and the point L, Fig. 2, made wavy or undulating, of not too abrupt character, but of uniform occurrence. These waves may be made either by indentation, elevations, or both, or linings, false bottoms, &c. By means of the pipes I I the air in the pipe G will be exhausted at the points L L, and the current of air from the reservoir, where it is maintained continuously at any desired pressure, or the atmosphere at its natural pressure, will rush through the tube G in the direction of the receiver K, Fig. 2, carrying whatever of limited quantities of grain, flour, or other commodity is continuously introduced into the current at a distance from the point A, the reservoir, or place of ingress of the air.

The manner of introducing or projecting the substance—grain, flour, &c.—to be transported into the current of moving air is to fill one of the air-tight bins E, Fig. 1, through the valve D, then close the valve D, turn on the pressure of the air from the reservoir by means of the valve or stop-cock s, open the valve or switch R, Fig. 1. The grain and flour or other article thus introduced into the moving current of air will rush with the current in suspension through the tube G with that velocity with which air under great pressure will seek to fill a vacuum, which vacuum will at all times be maintained, as nearly as is practicable.

To keep the grain, &c., off the bottom of the tube to prevent wear and friction, the waves or undulations H, Fig. 1, are made, and in such form as to be uniform and to create an upward current or tendency to the air, from which upward and onward current or trend the grains of wheat or particles of flour, &c., will constantly be receiving upward as well as onward motion, and cause the same to be transported in suspension. Point L, Fig. 2, will be located near the receiver K. The momentum of the article in transit will carry it past the exhaust-pipe L into the receiver K, which also has an exhaust-pipe through which any air that may escape into the receiver K will be exhausted. When the first receiver K has become nearly filled the pipe G will be connected through the switch P, Fig. 2, with the other receiver, from which in the meantime the air has been exhausted. At the time the switch to the second receiver is being made the switch N, Fig. 2, will be turned so as to cut off communication between the second receiver and the discharge-pipe M, Fig. 2, and at the same time allow the mails, flour, grain, or other substance in transit to be discharged from the first receiver through the pipe M into the pipe G', Fig. 2, through which a current of air is rushing from the reservoir A, Fig. 2, and so the operation of imparting a new impetus or momentum to the article in

transit may be repeated as often as may be required.

The pipe G may be laid on the ground or in the earth or suspended above the earth, and may be placed at any angle less than forty-five degrees without material interference with the working of the system. The receiver K will be placed at a point of considerable elevation above the surface of the earth at exposed points, and upon curves where the wave or undulating surface of the interior of the pipe, as shown at point H, Fig. 1, of pipe G, and consequent upward or side, as the case may be, current or trend to the air in the pipe G is not sufficient to prevent violent contact between the pipe G and the article in transit. The pipe should be lined with paper or other elastic substance, or be made of paper or such substance, or be coated on the interior surface with wax or other elastic or pliable substance. Of course the exhaust or vacuum will be located and maintained by any suitable means through the exhaust-tubes I I, Fig. 2, and any artificial pressure required at the remote end of the pipe G can be created and maintained by any suitable apparatus working into or communicating with the reservoirs A A respectively, Figs. 1 and 2.

I am aware that prior to my invention pneumatic conveyers have been used. I therefore do not claim such a combination, broadly.

What I do claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, in a pneumatic machine or apparatus, of a tube or pipe, G, through which a current of air is passed toward the receiver K at great velocity, and into which current, in limited quantities, at a point distant from the point of ingress of the air, is introduced or projected the mail-matter, flour, grain, or other article to be transported.

2. In a pneumatic apparatus, the combination of a pneumatic pipe or tube through which a current of air is passing with great velocity in the direction of the receiver K, the bins or hoppers E E, located at a distance from the point of ingress of the air into the tube G, and communicating therewith, the pipe B, Fig. 1, with stop-cocks s s and valves or slides D.

3. The uneven wave-like and undulating interior of the pipe, indented or raised and indented between the point F (and at a distance therefrom) and the point L.

4. The causing of an upward or side or both upward and side trend or current of air in the pipe G by means of the uniform unevenness (at any required point) of the interior of the pipe, causing the air in passing at regular intervals to be compressed, giving the article in transit such new impetus and direction in its flight as may be desired.

5. The exhaust-pipes I I, connecting with said tube G and receiver K, respectively, and having their ends protected by screens or bars so arranged as to draw the air from said pipe G and receiver K, respectively, as nearly in the line

from which the article in transit arrives as is practicable, the exit of the air being from the direction of the receiver, leaving the article in transit by its momentum to enter and settle into the receiver K.

6. The combination of the receivers K K with the discharge-pipe M and switch N, discharging into the pipe G' into a current of air moving with great velocity through said pipe G' from the point of ingress, (for said air,) and the reservoir A, the renewing of the momentum first imparted by means of the helper or pipe G', through which a current of air is impelled at great velocity.

7. In a pneumatic machine or apparatus, the combination of the reservoirs A A, the pipe B, connecting with the bins or hoppers E E, (with valves D,) and valves R R, connecting (at a point distant from the reservoir A) with the pipe G, through which a continuous current of air is propelled with or moving with exceeding great velocity toward the receiver K, and into which rapidly-moving current in said tube G grain, flour, the mails, or other article to be transported is introduced in limited but continuous quantity through the pipe F, and kept from the sides and bottom of said pipe G through the current of air created by suitable indentations or projections or both in the interior of the tube until the said article reaches

the receiver K, and, further, the combination aforesaid, together with the receivers K K, with switch N and discharge-pipe M, connecting with the pneumatic pipe G', connecting with the reservoir A and like exhaust-pipes I I and apparatus and like receivers.

8. A pneumatic pipe with the interior surface thereof lined or coated with paper, wax, or other elastic substance.

9. The transmitting or transporting in suspension through the pipe (pneumatic pipe G) of the article to be transported—grain, flour, &c.—by the inertia of moving air passing through the tube with terrific velocity over its uniform undulating—either raised or indented, or both—interior or part thereof, and causing at any given point or points in said pipe a current of air to move in any desired direction or trend by the same means.

10. The introduction into a continuous current of rapidly-moving air or other elastic fluid (at a point distant from the point of ingress thereof) of a continuous and limited quantity of flour, grain, or other article to be transported, all substantially as set forth.

JAMES W. BEACH.

Witnesses:

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