

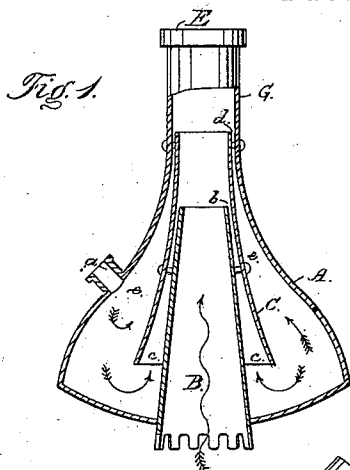
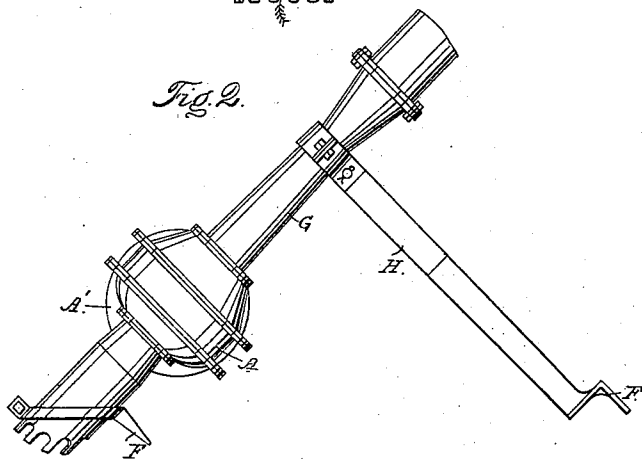
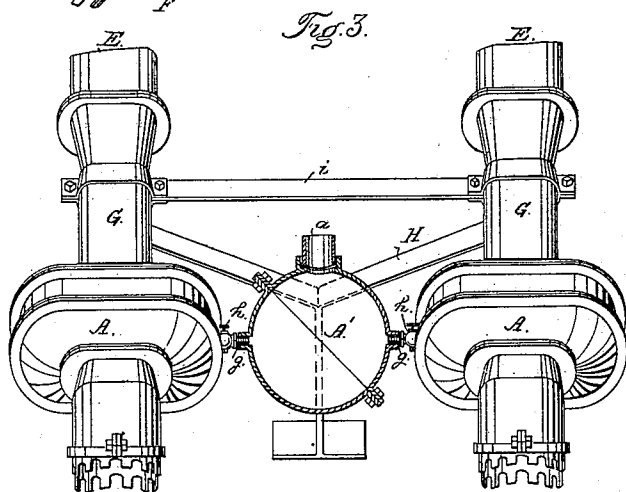
(No Model.)

2 Sheets—Sheet 1.

A. B. FERNALD & D. T. LAWSON.
APPARATUS FOR TRANSFERRING GRAIN, &c.

No. 337,388.

Patented Mar. 9, 1886.



Witnesses.

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their attorney.

(No Model.)

2 Sheets—Sheet 2.

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Fig. 4.

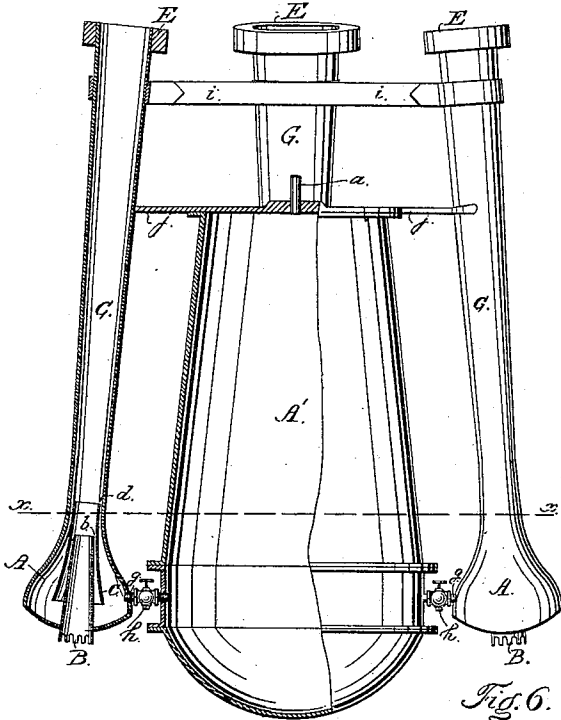


Fig. 5.

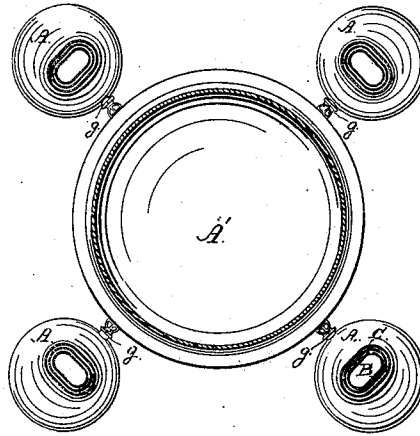


Fig. 6.

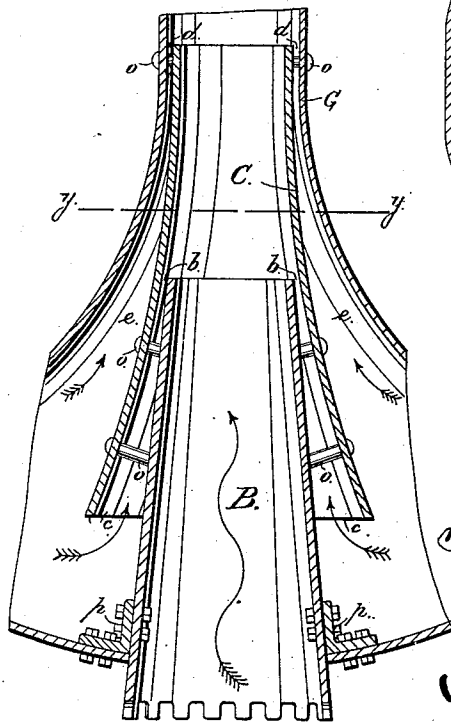
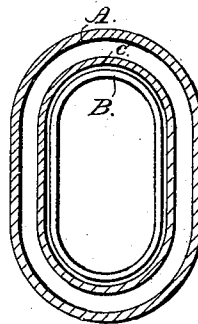


Fig. 7.

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UNITED STATES PATENT OFFICE.

ALEXANDER B. FERNALD AND DAVID T. LAWSON, OF JERSEY CITY, N. J.

APPARATUS FOR TRANSFERRING GRAIN, &c.

SPECIFICATION forming part of Letters Patent No. 337,388, dated March 9, 1886.

Application filed January 21, 1885. Serial No. 153,495. (No model.)

To all whom it may concern:

Be it known that we, ALEXANDER B. FERNALD and DAVID T. LAWSON, both residents of Jersey City, in the county of Hudson and State of New Jersey, have invented a new and useful Improvement in Apparatus for Transferring Grain and other Material, which improvement is fully set forth in the following specification.

This invention has more particular reference to means or apparatus, operated by the action of compressed air or gas, or similar agent, for the transfer of grain or like material from one receptacle to another, as from a bin or elevator to a car or vessel, or vice versa.

Its object is mainly to increase the efficiency of such apparatus, so as to utilize the force of the agent (air or gas) to the best effect, to render the apparatus portable, and to enable it to preserve its proper position in shifting the pile of grain or other material to be transferred.

In the present invention the nozzle from which issues the jet of air or other agent is constructed to surround the orifice through which the column of grain passes, instead of being placed in the same, and is not annular, but oval or elongated in shape, we having found that by such construction a much greater efficiency of action is obtained than with an annular jet of the same cross-sectional area. This is mainly attributable to the fact that with an oval or elongated jet-orifice all portions of the ascending column of grain are effectively acted upon, whereas with an annular jet (if it be of any considerable size) the center of the column is too remote for efficient action from the issuing jet.

The apparatus is preferably provided with two jet-nozzles or ejectors, arranged to act one directly in advance of the other, the tubes forming the same being inclosed one in the other. The second jet may be constructed to act in the midst of the column of grain, but preferably is arranged, like the first, to act around the periphery thereof. The arrangement in a grain-conveyer of two jet-nozzles or ejectors, one in advance of the other, is, however, believed to be new, irrespective of the particular construction of the nozzles or ejectors. Further, the invention contemplates the combination of a supply-reservoir with one

or more delivering-pipes, each having its ejector or ejectors, the parts being fastened together and constructed to form a compact portable apparatus, easily transported from place to place. It also contemplates the combination, with an air-reservoir, of two or more delivering-pipes, duplicates of each other, arranged at equal distances from said reservoir and connected therewith by suitable air-inlets in which cocks may be placed.

We construct the apparatus, whether composed of one, two, or more delivering-pipes, so that it may rest upon the pile of grain or other material without sinking too deeply into the same.

To facilitate the transfer of the grain, the conveying-pipes may be inclined more or less to the horizontal, whereby the grain is more easily drawn into the pipes.

The present invention comprises, in addition to the new improvements above indicated, the union or combination of two or more of them, and certain particular constructions and arrangements of parts hereinafter fully set forth.

In the accompanying drawings, which form a part of this specification, Figure 1 is a view in vertical section of a simple form of apparatus constructed in accordance with the invention; Fig. 2, a side view of an apparatus having duplicate grain-delivering devices; Fig. 3, a front elevation of same, (showing the air-reservoir in section;) Fig. 4, an elevation, partly in section, of an apparatus having four grain-pipes connected with a central reservoir; Fig. 5, a cross-section of the same; and Figs. 6 and 7 detail views showing the construction of the jet-nozzles or ejectors.

Referring more particularly to Fig. 1, A is the outer shell or casing of the apparatus, and forms the reservoir for the compressed air, gas, or other agent, which is admitted under pressure by inlet-opening *a*. This reservoir surrounds the grain tubes and ejectors. The grain-inlet pipe or tube B passes through the bottom of the reservoir, projecting slightly below it, and is notched at the end to facilitate admission of the grain. Surrounding this tube is a second tube, C, (see also Figs. 6 and 7,) sufficiently large to leave a narrow space between the two pipes for the passage of air, which discharges at *b*. The tube C flares outwardly at its lower end, *c*, where the air enters

from the reservoir. This tube C extends up into a tube or pipe, G, which forms the neck and continuation of reservoir A, between which and said tube is formed the second air-discharge, *d*. The tubes B C and the tube or neck G of reservoir or shell A are elongated or oval in shape at the points of discharge *b d*, as seen in Fig. 7. They may be flattened throughout their whole length, though this is not essential. By this construction the best effect of the force of the air-current is realized, as already explained.

In operation a current of air rushes into the passage *c*, gradually increasing in force as the passage contracts until it discharges at *b* with considerable velocity. The partial vacuum thus created draws the grain or other material upon which the vessel A is placed through inlet-pipe B until it passes the point *b*, when it is acted upon directly by the air-jet and carried forward to the point *d*, where its momentum is greatly augmented by the air-jet passing through passage *c* and discharging through the jet orifice or nozzle *d*. At E it passes into the conveying-hose, which is attached at that point to the delivering-tube G.

It will be observed that the shell or casing A has a broad under surface, which is slightly rounded. This construction, aided by the projection of the grain-inlet tube B, tends to keep the apparatus in an upright position upon the pile of grain, and to prevent its sinking too deeply therein, the broad bottom acting as a check or stop.

In Figs. 2 and 3 the invention is shown embodied in an apparatus having two delivering-pipes, G. The construction of each conveying-passage is substantially the same as that of the single conveying apparatus shown in Fig. 1, comprising a reservoir, A, terminating in the tube G and inclosing the ejectors. (Not shown.) In this case, however, the reservoir A is smaller in size, a main reservoir, A', being placed midway between the tubes, and connected with reservoirs A by short pipes *g*, in which cocks *h* may be placed. The pipes *g* also serve as a mechanical connection between the parts, which are further secured together and steadied by braces *i*.

The apparatus is connected with a hinged leg, H, whereby the delivery-tubes may be set at any desired angle. By thus inclining the grain-passage the lifting of the material is more easily accomplished than when vertical tubes are used. Moreover, the reaction of the air discharged through the jet-orifices tends to push the ends of the pipes B a proper distance into the grain. Fenders or stops *k* prevent them sinking too far, answering the same purpose in this respect as the shape of the shell or vessel A in Fig. 1.

Referring to Figs. 4 and 5, (the latter being a section on line *x x* of the former,) the apparatus is shown as provided with four grain-delivering pipes or passages, G, arranged around and at equal distances from a central reservoir, A', and fastened thereto by the

plate *j* and short pipes *g*, which latter also serve to admit the motive agent from reservoir A' to the reservoir A. Braces *i* may also be used to impart additional strength to the structure. Each of the four grain-passages is the duplicate of the others, and is substantially like that of Fig. 1. Air (or other agent) is admitted by cocks *h* through pipes *g* to the reservoir A, and passes through the elongated or oval jet-orifices *d d*, formed by the flattened tubes B C. The bottom of reservoir A' extends slightly below the level of the grain-inlet tubes B, so that all of these cannot be in contact with the floor of the bin at the same time. When, therefore, the material in the chamber is nearly exhausted, and the reservoir touches the floor, at least one of the tubes will be raised far enough above the latter to be operative. When this occurs, the supply of air can be cut off from the other pipes by means of cocks *h*. The pipes G, as shown, are slightly inclined. The broad under surface of reservoir A' acts as a check or stop, like that of reservoir A in Fig. 1.

In Figs. 6 and 7 the construction of the ejectors is illustrated on a larger scale than in the other views, Fig. 6 being a partial vertical section, and Fig. 7 a cross-section on line *y y* of the former.

The flattened tubes B C are secured together in any desired way—as by braces *o*—and the tube B is secured, as shown at *p*, to the bottom of the reservoir. The tube C may also be fastened by braces to tube or neck G, as shown. Of course any ordinary or suitable way of securing these parts rigidly together may be followed.

It will be observed that all the apparatus described embody substantially the same features, and are the same in principle. Each constitutes a light, strong, and portable device, which can be readily moved from one place to another, and which does not require to be hung, held, or fastened in place, but need only be placed in the bin or chamber containing the grain or other material, in which it will maintain its proper position, sinking down as the quantity of such material gradually diminishes.

It is obvious that various other modifications in addition to those specially pointed out may be made, and that some of the improvements may be used separately from the others, without in either case departing from the spirit of the invention.

Having now fully described our said invention, and the manner in which the same is or may be carried into effect, what we claim is—

1. In a device for conveying grain or other material, the combination, with the grain-inlet pipe or tube, of a surrounding pipe or tube forming a jet-orifice for the compressed air or gas by which the grain is lifted, said pipes or tubes being elongated or oval in shape at the point of discharge, substantially as described.

2. A grain-conveyer operating by compressed air, gas, or similar means, having an

oval or elongated jet-orifice which discharges in the direction of the moving grain, substantially as described.

3. In a pneumatic grain-conveyer, the combination, with the grain-pipe, of two ejectors or jet orifices, the one directly in advance of the other, substantially as described.

4. The combination of the air-reservoir having a contracted and flattened prolongation or neck, a tube or pipe within the same, also flattened at its upper end, so as to form an oval or elongated jet-orifice, and a second tube or grain-inlet, substantially as described.

5. In a pneumatic grain-conveyer, the combination, with the air-reservoir and delivering-pipe forming a prolongation thereof, of two concentric tubes arranged therein to form two jet-orifices or ejectors, one in front of the others, and both surrounding the grain-orifice, substantially as described.

6. In a grain conveyer, the combination of an air-reservoir and three concentric tubes flattened at their upper ends and arranged, as specified, to form two oval or elongated jet-orifices, one in advance of the other, substantially as described.

7. The combination, with a central air-reservoir, of two or more grain-pipes, an ejector or jet-orifice in each pipe, and connections for supplying air thereto from said reservoir, substantially as described.

8. In a grain-conveyer, the combination, with two or more grain delivering pipes comprising each an inclosing air-reservoir, a grain-inlet, and an ejector having an oval discharge-orifice, of a central reservoir supported between said pipes and connected with said first-named reservoirs, substantially as described.

9. The combination of an air-reservoir, one or more delivering-pipes containing each an ejector or ejectors, and means, as specified, for keeping said pipe or pipes in an inclined position, substantially as described.

10. A portable pneumatic grain-conveying apparatus comprising an air-reservoir, a grain-

inlet, a delivering-pipe, and an ejector or ejectors, said apparatus being adapted to rest in or upon the material to be transferred, and being constructed and arranged, as specified, to maintain its proper position therein, substantially as described.

11. The combination of a central air-reservoir and two or more grain-delivering pipes connected therewith and constructed substantially as described, the bottom of said reservoir projecting below the lower ends of the grain-pipes, as and for the purpose set forth.

12. In a pneumatic grain-conveyer, the combination, with the grain pipe or pipes provided each with an ejector, of an air-reservoir connected therewith, said reservoir having a broad under surface adapted to rest upon the grain or material to be transferred, substantially as described.

13. A pneumatic grain-delivering apparatus comprising an air-reservoir, a grain-inlet, an ejector or ejectors, and means, such as specified, to prevent the apparatus sinking too far into the material to be transferred, substantially as described.

14. A portable pneumatic grain-conveying apparatus comprising the following elements in combination: a main air-reservoir, two or more grain-pipes having each two oval or elongated jet-orifices or ejectors, arranged one in front of the other, and a grain-inlet, short pipes for supplying air to said ejectors from said reservoirs, cocks in said pipes, and means, as specified, for enabling the apparatus to maintain its position in the pile of grain or other material to be transferred, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

ALEXANDER B. FERNALD.

DAVID T. LAWSON.

Witnesses:

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H. D. ROGERS.