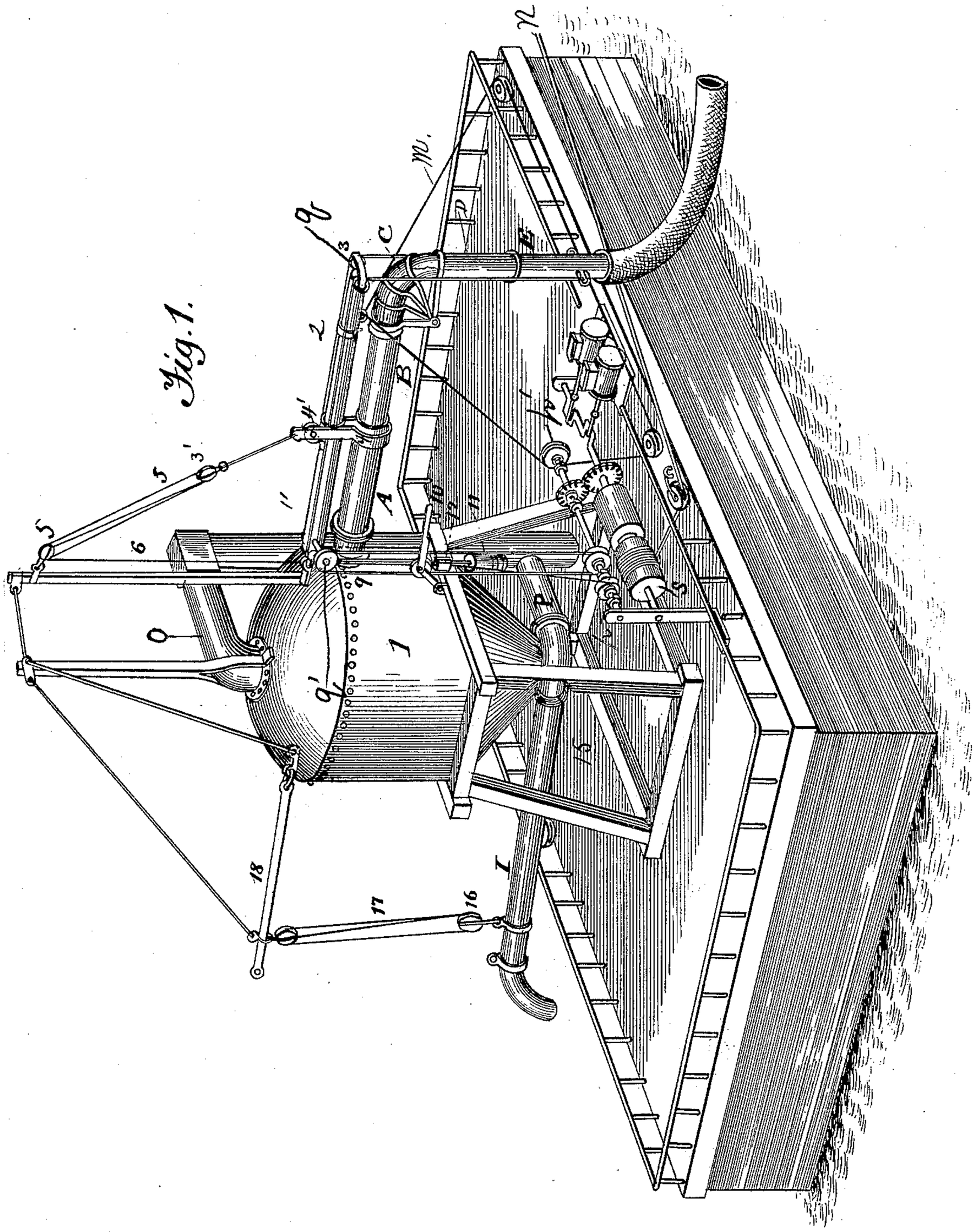
(No Model.) 3 Sheets—Sheet 1.

L. SMITH.

PNEUMATIC GRAIN CONVEYING APPARATUS.

No. 405,331. Patented June 18, 1889.

Fig. 1.



Witnesses.
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(No Model.) 3 Sheets—Sheet 2.

L. SMITH.

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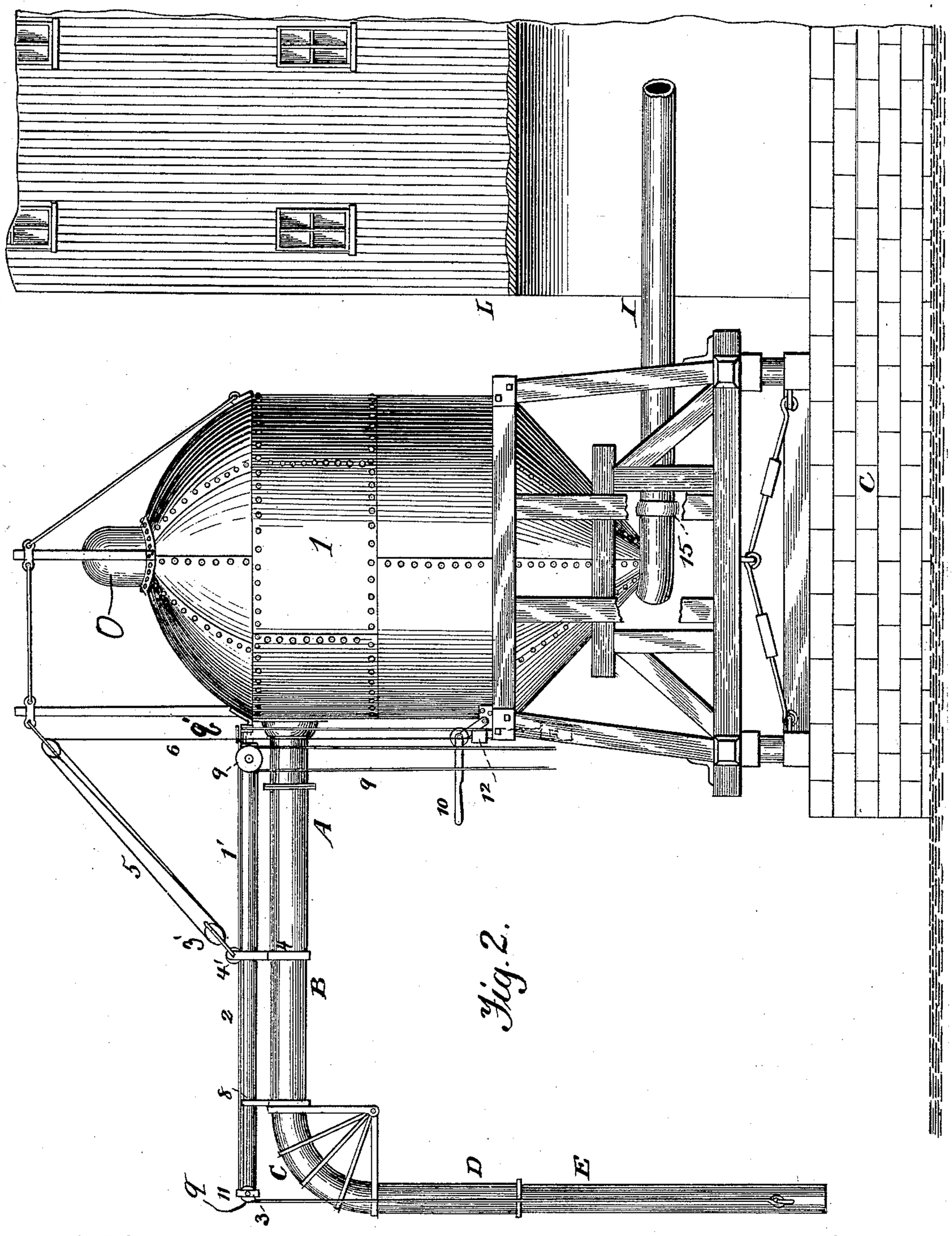

Fig. 2.

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(No Model.) 3 Sheets—Sheet 3.

L. SMITH.

PNEUMATIC GRAIN CONVEYING APPARATUS.

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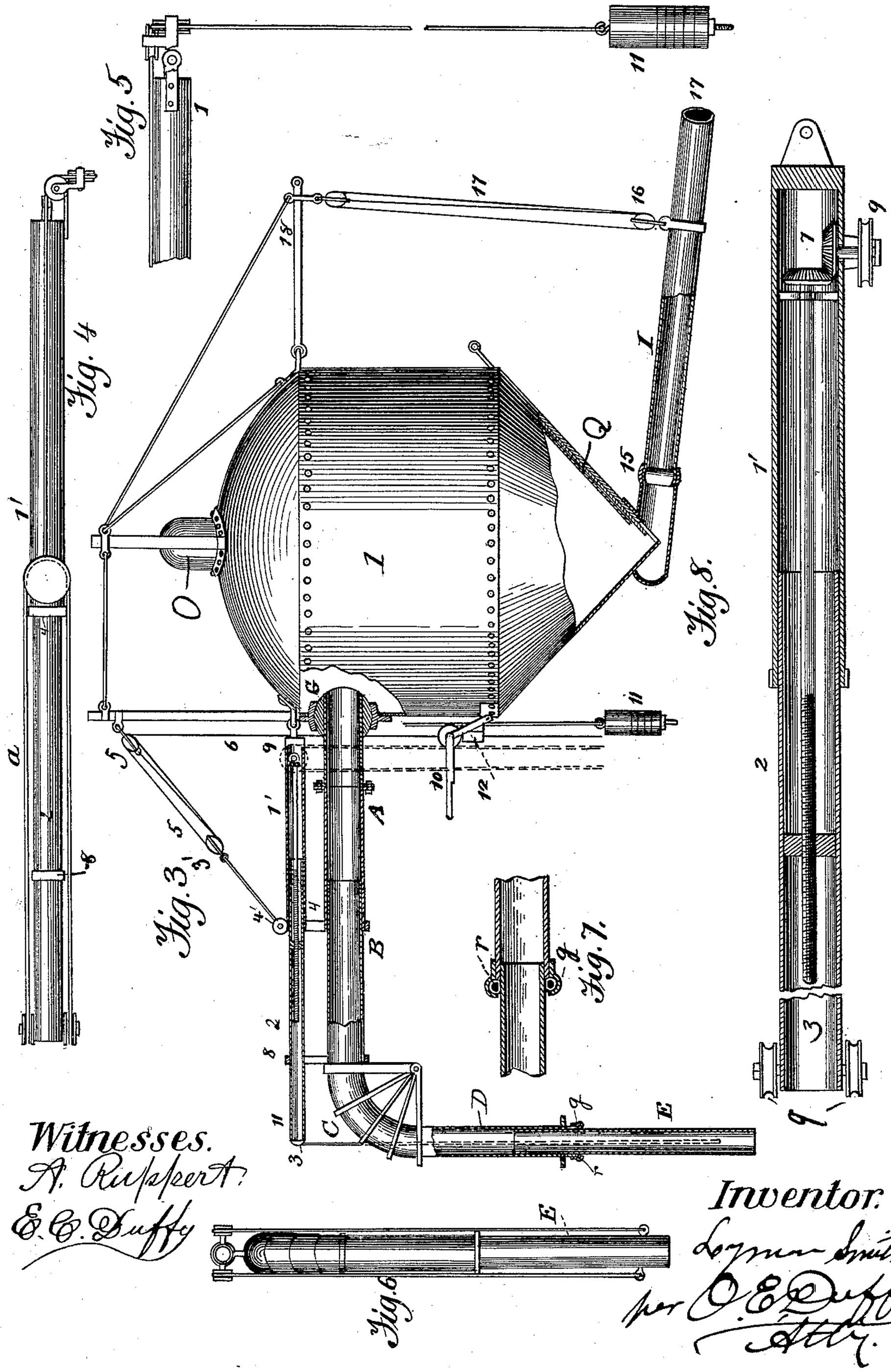

Witnesses.
A. Ruppert.
E. C. Duffy

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UNITED STATES PATENT OFFICE.

LYMAN SMITH, OF KANSAS CITY, MISSOURI.

PNEUMATIC GRAIN-CONVEYING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 405,331, dated June 18, 1889.

Application filed February 17, 1888. Serial No. 264,395. (No model.)

To all whom it may concern:

Be it known that I, LYMAN SMITH, of Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Pneumatic Grain-Conveying Apparatus; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

My invention relates to an improvement in pneumatic grain-conveying apparatus, and has for its object the production of a complete apparatus for transferring grain, material of broken lump formation, or other substances pneumatically, and loading and unloading, distributing, and locating the material wherever desired within a suitable distance from a barge or other plant or to and from other places by a line or lines of pipes.

With these ends in view the invention consists in certain novel features of construction and combinations of parts more fully described hereinafter, and particularly pointed out in the claims.

Figure 1 of the drawings represents the apparatus in perspective, showing all the working parts in position; Fig. 2, a side elevation of the machine, represented as filling a grain-elevator. Fig. 3 is a partial side elevation and partial section of the machine, whereby the construction of some of its vital parts is shown. Fig. 4 is a plan view of the boom enlarged; Fig. 5, a side elevation of the boom, partly broken off, and of the counterpoise-weight. Fig. 6 is an end elevation of the sectional or telescopic pipe in a downwardly-extending position. Fig. 7 is a detail view of one of the telescopic joints having around its periphery at the end of one of the sections a packing of rubber hose inclosed within a shield arranged in such manner that when the machine is in operation the joints become tight by the suction of the vacuum, and Fig. 8 is an enlarged sectional plan view of the boom.

In the drawings, the reference-figure 1 indicates a receiving-tank, which can be placed upon a suitable foundation or upon a dock, pier, or wall in close proximity to an elevator or other building, as shown at L. The receiving-pipe A B C D E can be made of any size or form to suit the capacity or position of the tank, elevator, or vessel. As generally and preferably constructed, however, said pipe is about twenty inches in diameter, with a capacity of one thousand bushels per minute. As shown, the pipe A B C D E is strongly made of suitable material and connected to the receiving-tank by a universal or ball joint G, constructed to allow the pipe to be swung in any direction and yet form an air-tight joint. The horizontal sections A and B of the receiving-pipe are connected with the vertical sections D E by an adjustable elbow or curved pipe-section C, allowing the vertical portion of the receiving-pipe to be adjusted in a vertical plane of one hundred and eighty degrees, more or less. This adjustable curved pipe-section is not fully shown, described, nor claimed *per se* in this application, but forms the basis of an application filed by me on even date herewith and bearing Serial No. 264,394.

As before mentioned, the inner end of section A is secured to the main tank by a universal joint, while its other end receives the section B, which telescopes into the same, thereby allowing the horizontal portion of the receiving-pipe to be reduced in length nearly one-half or drawn out its full length. The vertical portion is also telescopic. The section D is secured to the adjustable elbow, and the lower section E telescopes into said section D. The joints between the sections are air-tight, and yet constructed to allow the sections to be turned or revolved independently of each other. Said joints are provided with packing-rings *r*, of gum or other suitable material, embracing one section and protected and held in position by shields or sleeves *g*, (see Fig. 7,) carried by the next adjoining section and embracing and holding said ring, whereby when the apparatus is in operation the suction will draw the packing-ring against the section it embraces and prevent leakage, thus making the joints air-tight.

The receiving-pipe is manipulated by an adjustable boom or gaff 1′ 2 3, whereby the pipe can be adjusted to any desired vertical, horizontal, or other position. Said boom is

located above and parallel with the upper portion of the receiving-pipe, and is preferably composed of telescopic tubular sections 1′ and 2. The section 1′ is secured to the tank 1 by an eye or universal joint, and is connected with the section A of the receiving-pipe by a strap or band 4, provided with a roller 4′, as shown. The outer section 2 of the boom is permanently secured to the outer end of pipe-section B, and telescopes into boom-section 1′ by means of a threaded rod longitudinally located in the boom and working in a fixed nut in the end of boom-section 2. The rod is operated by bevel-gearing 7, located within the boom and driven by a rope from the hoisting-engine, as shown at 9. The rope for operating the bevel-gearing can be tightened in any suitable manner, as by an angle-lever pivoted to the main tank and carrying a pulley, as shown at 10, bearing against said rope.

It will be readily seen that the length of the receiving-pipe can be readily changed by operating the adjustable boom in the manner just described, and the boom, and hence the receiving-pipe, can be raised and lowered by a system of ropes and pulleys, as shown at 3′, 5, and 6, the fall line passing down to a drum *p* of the hoisting-engine, by which it is readily operated. This rope or line passes through a suitable jamb-clutch at 12, (not shown,) where it can be readily secured when necessary.

The lower section E of the receiving-pipe is sustained in the desired adjustment by a counterpoise or counterbalancing weight, as shown at 11. This weight is located at the rear or inner end of the receiving-pipe and adjustable boom, and is connected with the section E by ropes, chains, or the like extending upwardly along the vertical portion of the receiving-pipe, and then horizontally along the boom, and then down to the weight, and operating over pulleys *q* and *q′* at each end of said boom. The discharge-pipe is shown at I, and is provided with a universal joint 15, rendering it capable of being swung in any direction by the ropes and pulleys at 16 and 17, and suspended from the gaff 18.

m indicates a rope operated by one of the drums *p′* of the engine and secured to the adjustable boom, whereby the receiving-pipe can be moved laterally the desired amount, and N indicates an additional rope passing from a main drum *s* of the engine through suitable sheave-blocks. This rope is to be used for hauling vessels or boats alongside or for shifting them while being loaded or unloaded.

The device herein shown can be provided with suitable means (not shown) for weighing the contents of the receiver.

In operation, when it is desired to unload a vessel, &c., and discharge the grain into some suitable receptacle, the receiving-pipe is adjusted longitudinally by the adjustable boom and the vertical portion E vertically and to the desired angle by the movable elbow and the counterweighted sections until the receiving-pipe assumes the desired operative position relative to the receiving-tank and the vessel to be unloaded. The exit from the receiving-tank into the discharge-pipes is then closed by slides or door Q, and the air from the receiving-tank is exhausted through the suction-pipe O, opening into the top of the same, thus creating a partial vacuum in said tank and causing the grain to be drawn rapidly into the same through the supply-pipe. When the receiving-tank is filled, the discharge-pipe is adjusted and swung into operative position relative to the vessel to be filled. The slide Q, for opening or closing the opening at the bottom of the tank into the discharge-pipe, is then opened, and the grain falling through said opening into the pipe is blown through the same by air forced into the discharge-pipe from pipe O through pipe P, connecting the same.

What I claim is—

1. In a pneumatic grain-conveyer, the combination of a receiving-tank provided with an air exhaust or suction pipe, a receiving-pipe composed of vertical and horizontal sections, an adjustable elbow connecting said sections, a universal joint securing the horizontal section to the tank, and a system of ropes and pulleys for supporting and operating the receiving-pipe, substantially as described.

2. The combination of the receiving-tank and the receiving-pipe consisting of telescopic vertical and horizontal sections, an adjustable elbow connecting the sections, and a universal joint by which the receiving-pipe is connected to said tank, as set forth.

3. The combination of a receiving-tank provided with a suction or air pipe, a receiving-pipe composed of telescopic horizontal and vertical sections, an adjustable support or boom carrying the receiving-pipe and by which the same is longitudinally adjusted, a universal joint securing the horizontal section to the tank, a discharge-pipe for the tank secured to the same by a universal joint, and systems of ropes, pulleys, &c., by which the discharge-pipe and adjustable support are carried and operated, substantially as described.

4. The combination of the receiving-tank, the receiving-pipe composed of telescopic sections, and the telescopic boom supporting said pipe and adapted to adjust the same, as set forth.

5. The combination of a tank, a receiving-pipe composed of horizontal and vertical sections, the horizontal section being secured to the tank by a universal joint and the vertical portion being formed in telescopic sections, and a counterpoise for the vertical section, consisting of a weight located below the universal joint and ropes following the line of the receiving-pipe and secured to the bottom section of the vertical portion, substantially as described.

6. The combination of a receiving-tank, a receiving-pipe composed of horizontal and vertical portions connected by an adjustable elbow and composed of telescopic sections, a counterpoise for the vertical telescopic sections, and a telescopic boom above and parallel with the horizontal portion of the pipe and secured to the same, by which the length of the pipe is increased or diminished.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

LYMAN SMITH.

Witnesses:
HUBERT E. PECK,
J. C. STODDARD.