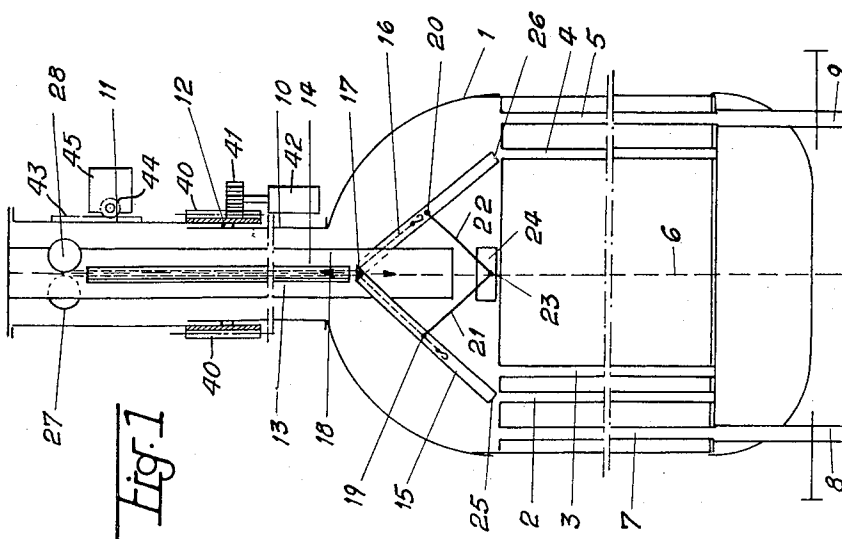
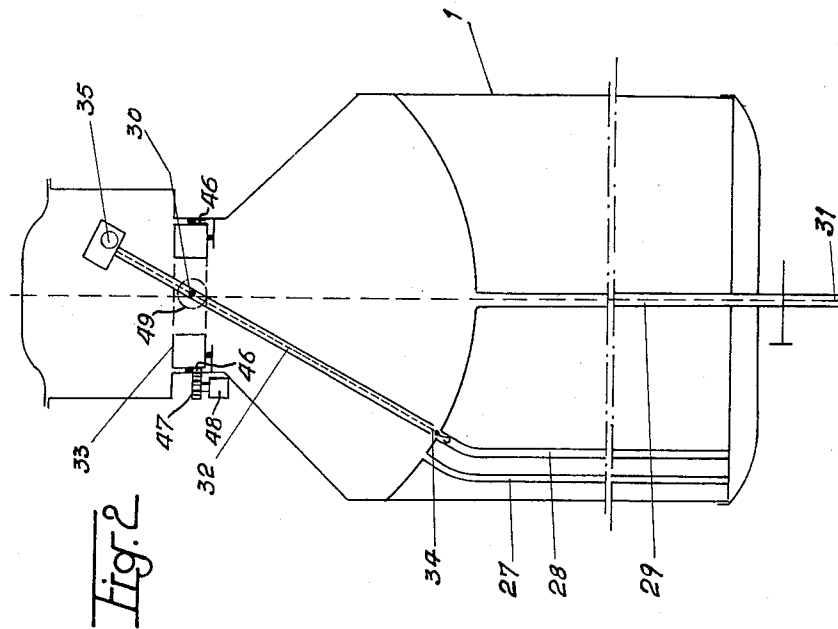


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ARRANGEMENT FOR INTRODUCING ARTICLES INTO
A CLOSED CHAMBER AND FOR REMOVING SAME
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1

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ARRANGEMENT FOR INTRODUCING ARTICLES INTO A CLOSED CHAMBER AND FOR REMOVING SAME

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Our invention has for its object an arrangement for introducing articles into a chamber the access into which is difficult and which may be subjected to a pressure differing from the pressure of the surrounding medium, said arrangement allowing also the removal of said articles out of the chamber.

Our invention relates more particularly, but not exclusively to the case wherein said members are to be laid selectively in predetermined locations of the chamber and, for instance, they may be introduced into bundles of cylindrical tubes located inside said chamber.

To this end, at least one of said tubes communicates through its lower end with the outside of the chamber, preferably through the agency of a sluice, and the arrangement includes inside the chamber at least one shiftable trough the lower end of which is adapted to be brought into registry with the upper end of any one of the cylindrical tubes located in the chamber, while means are provided for shifting said trough in two orthogonal directions and a cable positioned in said trough carries at one end hooking means adapted to be connected with or separated from the articles to be introduced which have been previously interconnected after the manner of a string of beads, a winch being used for the winding and unwinding of the cable.

In a first embodiment relating more particularly but not exclusively to the handling of small articles, the inner arrangement includes a vertical tube extending coaxially inside a moving turret and a trough pivotally secured at its upper end registering with said vertical tube to a spindle rigid with the turret, while it is pivotally secured in its middle to the end of a link the length of which is equal to one half that of the trough; the lower end of said connecting link is pivotally secured to a carrier; the turret is adapted to be shifted both axially and revolvably and the last mentioned carrier is only capable of rotating.

Under such conditions, the upper end of the trough remains always in registry with the lower opening of the vertical tube and the lower opening of the trough may be shifted in a plane perpendicular to the axis of the turret so as to be brought, through rotation and axial shifting of the turret, into registry with the upper opening of any one of the vertical tubes located in the chamber.

According to a modification of this embodiment, there may be provided at least two vertical tubes engaging each other along a common generating line coinciding with the axis of the turret, said tubes being associated with as many troughs mounted in a manner which has just been described.

According to a further embodiment of my invention adapted more particularly but not exclusively for the handling of bars, the tubes housed inside the chamber have their upper ends located on a spherical cap the concavity of which faces upwardly and there is provided a movable trough suspended through a cardan joint and

2

moving inside said cap round an axis passing through the center of the latter.

In either of said embodiments, there is provided at least one winch carried by the system and over which a weighted cable is wound, the end of which cable is provided with an article grasping system controlled from a distance; said cables are intended for the transportation of various articles and pass through the troughs.

The arrangement which has been described operates as follows: the articles to be introduced into the chamber are first interconnected so as to form a yielding string of a length which is substantially equal to the length of the tube adapted to enclose them. The string is then introduced into the sluice which latter is then connected with the inside of the chamber.

Through a suitable operation of the arrangement, the end of each trough is brought into registry with the upper end of the tube communicating with the outside of the chamber, while the cable is caused to sink until it engages the upper section of the string of articles to which it is then hooked. The string of articles is then raised through the tube and trough and the end of said trough is then brought through a further operation into registry with the tube into which the string is to be introduced. The winch is then started so as to unwind the cable and when the string has been entirely introduced into last mentioned selected tube, the means for hooking the cable to the string are released. The cable is then raised into its original position and a further loading may be executed.

Further features of our invention will appear in the reading of the following description given by way of a mere exemplification and by no means in a binding sense. In accompanying drawings illustrating said description, Figs. 1 and 2 are diagrammatic sectional elevational views of two embodiments of the invention.

In the embodiment illustrated in Fig. 1, the chamber 1 includes a number of tubes such as 2, 3, 4, 5, 7, the axes of which are parallel with the axis of the chamber. The tubes 5 and 7 communicate with the outside of the chamber through the sluice compartments 8 and 9. In the upper section of the chamber 1 and coaxially therewith is arranged a vertical cylindrical turret including two telescopically interengaging elements 10, 11 between which is fitted a fluidtight packing which provides for the rotary and axial shifting of the upper element 11 of said turret.

Inside the latter are arranged two tubes 13 and 14, the diameters of which are slightly larger than the diameters of the articles to be handled. The two tubes are in contacting relationship along a common generating line extending in registry with the axis 6 of the turret and of the chamber.

Two symmetrical troughs 15 and 16 are located in a common vertical plane passing through the said axis 6 and their upper ends are positioned in registry with the lower ends of the tubes 13 and 14, respectively. Said upper ends of the troughs are pivotally secured at 17 to a member 18 rigid with the upper element 11 of the turret.

The troughs 15 and 16 are also pivotally secured at their medial points 19 and 20 to the links 21 and 22 the opposite ends of which are pivotally secured to a common pivot 23 on the carrier 24 which follows the rotary movement of the turret without following its axial movements.

The length of each link 21 or 22 is exactly one half the common length of the troughs 15 and 16 and the points of pivotal connection with the latter at 19 and 20 are located at equal distances from the ends of the

3

corresponding troughs. The pivotal connections 17 and 23 are both located on the axis 6.

Thus, the troughs 15 and 16 form the hypotenuses of the two deformable right-angled triangles the median lines 21, 22 of which have a constant length and consequently the lower ends 25 and 26 of said troughs move in a horizontal plane when their upper ends follow the axial movements of the turret. It is apparent that it is possible to obtain experimentally a scale of references showing which pair of symmetrical tubes registers at any moment with the lower openings 25 and 26 of the troughs.

In the embodiment illustrated, the lower element 10 of the turret is rigid with the chamber 1 while the upper element 11 is axially and revolvably shiftable. For this purpose element 11 has a ring gear 40 fixedly mounted thereon, which gear is engaged by the pinion 41 driven by motor 42 for rotating said element 11. Said ring gear is of sufficient length to allow said element 11 to be axially moved while said gear remains in engagement with said pinion, and this axial or longitudinal movement of element 11 is provided by a longitudinally extending rack 43 fixedly mounted thereon which is in engagement with a pinion 44 driven by motor 45.

In registry with each of the upper vertical tubes 13 and 14 and at the upper end thereof are located winches 27 and 28 over each of which is wound a cable the free end of which is provided with grasping means of any type adapted to be controlled from a distance.

The arrangement which has just been described operates as follows: the articles which should be introduced into the chamber are first interconnected so as to form a yielding string the length of which corresponds to that of the tubes such as 2, 3, 4. Two of said strings are introduced into the corresponding sluice compartments 8 and 9 respectively which have been previously set in communication with the outer atmosphere. This communication being then shut off and each sluice chamber being on the contrary set in communication with the inside of the chamber, the winches are started and unwind the cables. The cable wound off the winch 27 progresses inside the tube 13 and the trough 15 and enters the tube 7 while the other cable follows a similar path through the tube 14, the trough 16 and the tube 5. This unwinding continues until each cable is hooked on to the upper article of the string registering with the corresponding tube 7 or 5 opening into a sluice.

The winches are then started in the opposite direction and raise each their string of articles until said strings of articles disappear inside the corresponding tubes 13 and 14.

Through a suitable shifting of the section 11 of the turret both angularly and axially, the ends 25 and 26 of the troughs are brought into registry with two symmetrical tubes such as 2 and 4 which are to be loaded. This being done, the winches are started again so as to unwind the cable and the corresponding strings are thus lowered into said tubes. At this moment, the cables are released with reference to the strings of articles and raised. The arrangement is ready to operate again, for instance, in accordance with a succession of steps which is the reverse of that which has just been disclosed, so as to provide for the unloading of the articles out of the chamber.

It should be remarked that in the embodiment described, the length of the tubes 13 and 14 and, consequently, the height of the turret 10—11 may be substantially reduced, provided the added length of the tubes and troughs such as 13, 15 on the one hand and 14, 16 on the other remains slightly longer than the total length of the string of articles to be handled.

The embodiment illustrated in Fig. 2 includes also a chamber 1 in which are arranged bundles of tubes 27, 28, a tube 29 being arranged coaxially with the chamber and communicating with the outer atmosphere through the sluice compartment 31. The upper openings of the tubes

4

27, 28, 29, etc. are located on a spherical cap, the concavity of which faces upwardly while its center is shown at 30. The different tubes 27, 28, etc. are preferably bent at their upper ends so that said ends may lie normally to the surface of the spherical cap.

At the upper end of the chamber is arranged a tube 32 the inner cross-section of which is slightly larger than that of the articles to be handled, said trough-forming tube being adapted to rock round a horizontal axis passing through the center 30 of the cap. Said rocking axis is constituted by a spindle carried by a revoluble ring 33, so that the lower end 34 of the tube 32 may scan the entire upper surface of the above referred to spherical cap.

A ring gear 46 is fixedly mounted on ring 33 and is in engagement with a pinion 47 driven by motor 48 to permit the rotation of said ring 33. Motor 40 is fixedly mounted to spindle 30 for driving the same to pivot tube 32.

At the upper end of the tube 32 is provided a winch 34 over which is wound a cable similar to the cable described with reference to the first embodiment.

The operation of this embodiment is similar to that described with reference to Fig. 1. The tube 32 is brought into registry with the vertical tube 29, the sluice chamber 31 through which the string of articles is to be introduced communicating then with said tube.

The cable is then unwound and sinks through the tubes 32 and 29. After engagement with the string of articles, the winch is started in the opposite direction until the string of articles is entirely enclosed inside the tube 32. The latter is then brought into registry with any of the tubes such as 27 or 28, as desired, and the winch again unwinds the string of articles to lower it into the selected tube. The cable is then released and raised so that the arrangement is ready for further operation. This further operation may be as well an unloading in accordance with a reverse procedure or a further loading executed in the manner already described.

The embodiments which have just been described are obviously given merely by way of exemplification and many detail modifications may be brought thereto without unduly widening thereby the scope of the invention as claimed in the accompanying claims.

What we claim is:

1. An arrangement for introducing articles into and removing the same out of a chamber, comprising a closed chamber, at least one tube extending inside said chamber having an end thereof communicating with the outside of said chamber, a plurality of tubes housed inside said chamber and entirely contained therein, at least one trough movably mounted inside said chamber with an end thereof capable of being brought into register with an end of any of said tubes, means for shifting said trough in two orthogonal directions, and flexible driven means extending through said trough and capable of extending in any of said tubes with which said trough is aligned for moving into and out of said trough articles to and from said first mentioned tube to be introduced through said trough into and out of said tubes.

2. An apparatus for introducing articles into and removing the same out of a chamber, comprising a closed chamber, at least one tube extending inside said chamber, a sluice connecting an end of said tube with the outside of said chamber, a plurality of tubes housed inside said chamber and entirely contained therein, at least one trough movably mounted inside said chamber with an end thereof capable of being brought into register with an end of any of said tubes, means for shifting said trough in two orthogonal directions, and flexible means extending through said trough and movable into any of said tubes in alignment with said trough for shifting into and out of said trough articles to and from said first mentioned tube to be introduced through said trough into and out of said tubes.

5

3. An apparatus for introducing articles into and removing the same out of a chamber, comprising a closed chamber, at least one tube extending inside said chamber with an end thereof communicating with the outside of said chamber, a plurality of tubes housed inside said chamber and entirely contained therein, at least one trough movably mounted inside said chamber with an end thereof capable of being brought into register with the upper opening of any of said tubes, means for shifting said trough in two orthogonal directions, a cable slidably mounted through said trough and one of said tubes registering therewith, grasping means at one end of said cable adapted to engage the articles to be introduced into said chamber and a driven winch over which the opposite end of the cable is adapted to be wound and unwound being connected to said trough for movement therewith.

4. An apparatus for introducing articles into and removing the same out of a chamber, comprising an open end chamber, a turret capping said chamber open end and capable of revolving around and moving longitudinally along the longitudinal axis of said chamber, a pipe system fixedly mounted in said turret for movement therewith and arranged coaxially with reference thereto, at least one tube located in said chamber and communicating through an end with the outside of said chamber, a series of tubes substantially parallel with said first mentioned tube and positioned inside said chamber, a pair of troughs positioned within said chamber and each having one end thereof in register with an end of a corresponding pipe of said pipe system, a spindle extending across said turret and to which each trough is pivotally secured through said end thereof, a pair of links the length of each of which is equal to half of the length of each trough each being pivotally connected at one end to the middle of one of said troughs, a horizontal carrier adapted to revolve around but not along the axis of said turret and to the center of which the other ends of said links are pivotally secured, the rotary and axial movements of said turret providing a shifting of other ends of said troughs in two orthogonal directions to shift said other end of each trough into registry with an opening of any of said tubes, and flexible driven means extending through said pipes for moving with and from said troughs at least one article to and from said first mentioned tube into and out of one of said series of tubes as said troughs are placed in register with each tube.

5. An apparatus for introducing articles into and removing the same out of a chamber, comprising a closed chamber, at least one tube extending inside said chamber with the lower end of said tube communicating with the outside of said chamber, a plurality of tubes housed inside said chamber and entirely contained therein, a spherical cap carried inside said chamber facing upwardly and into

6

which open the upper ends of said tubes, a driven ring rotatably mounted in said chamber laterally of the axis of said cap, at least one trough pivotally connected to said ring, driven means for pivoting said trough which can be directed thereby and through rotation of said ring to rock in all directions around the center of the latter for opening at its lower end selectively into the upper end of any of said tubes in said chamber, a cable capable of moving through said trough and any of said tubes in alignment therewith, means carried at the lower end of said cable for engagement with the article to be introduced into and to be removed from said trough into and from any of said tubes and a driven winch connected to said trough over which is wound and unwound the other end of said cable extending out of the upper end of said trough.

6. An apparatus for introducing articles into and removing the same out of a chamber, comprising a closed chamber, at least one tube extending inside said chamber and having the lower end thereof communicating with the outside of said chamber, a plurality of tubes housed inside said chamber and entirely contained therein, a spherical cap carried facing upwardly inside said chamber and into which open the upper ends of said tubes, at least one trough extending through the axis of said cap and capable of revolving around said axis, a ring rotatably mounted in said chamber laterally of said cap axis, a rotatably driven spindle having said trough secured thereto and extending diametrically across and being pivotally mounted on said ring, means for driving said ring in rotation from the outside of said chamber with the rotation of said ring and rocking of said trough through said spindle being adapted to make said trough open at its lower end selectively into the upper end of any of said tubes in said chamber, a cable capable of moving through said trough, means carried at the lower end of said cable for engagement with the article to be introduced into and to be removed out of any of said tubes into and from said trough and a driven winch mounted in said chamber over which is wound and unwound the other end of said cable extending out of the upper end of said trough.

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