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2,216,563

VALVING MACHINE

Filed Nov. 21, 1938

2 Sheets-Sheet 1

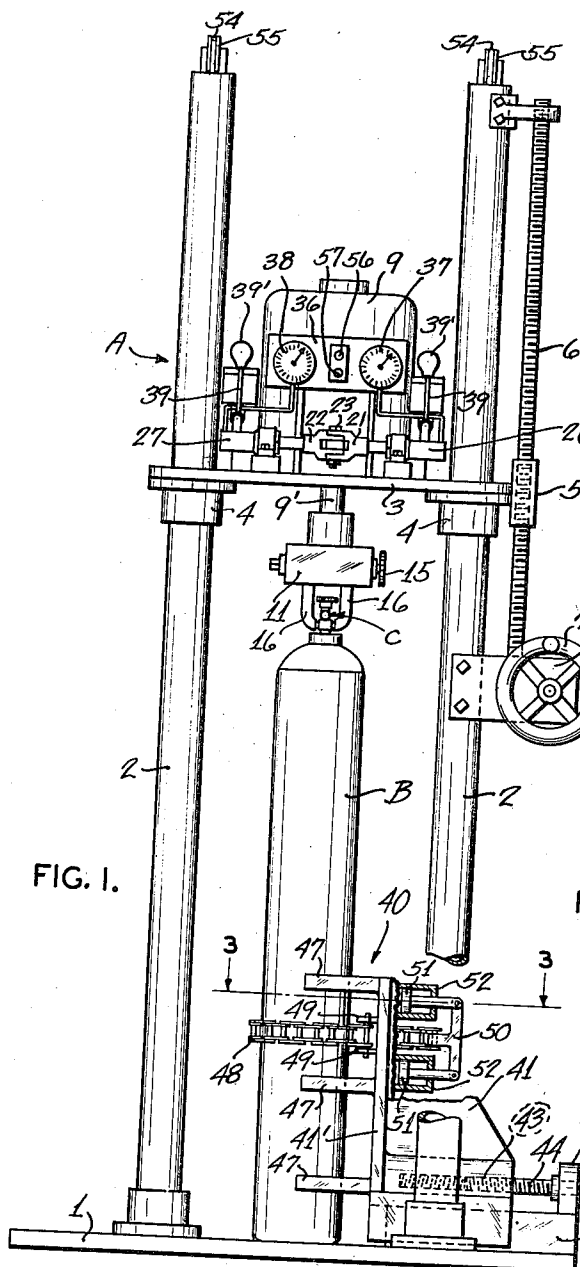


FIG. 1.

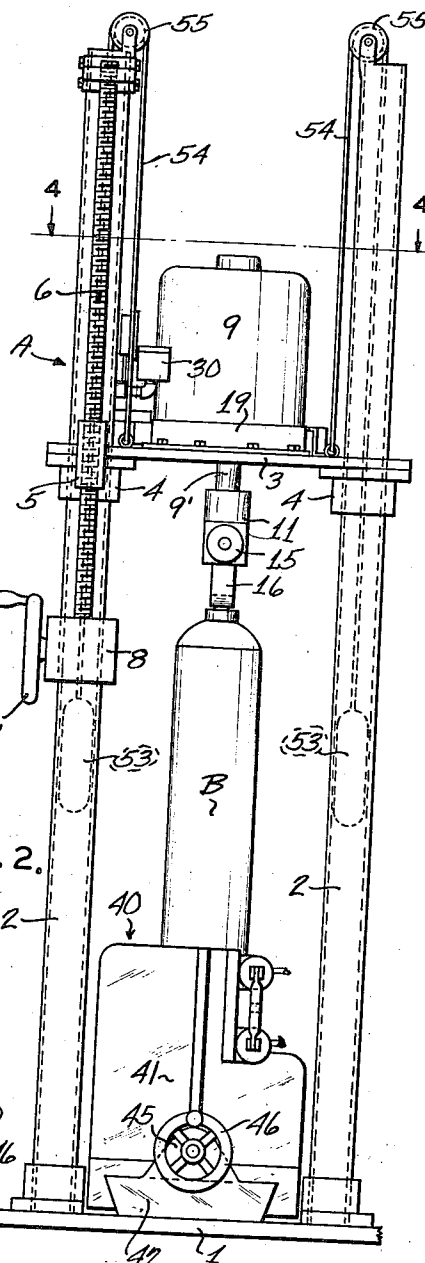


FIG. 2.

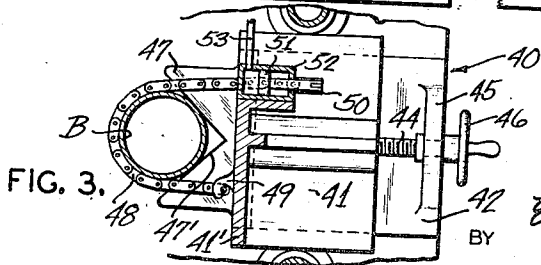


FIG. 3.

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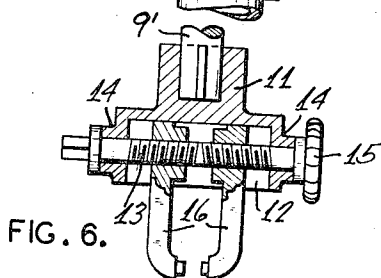
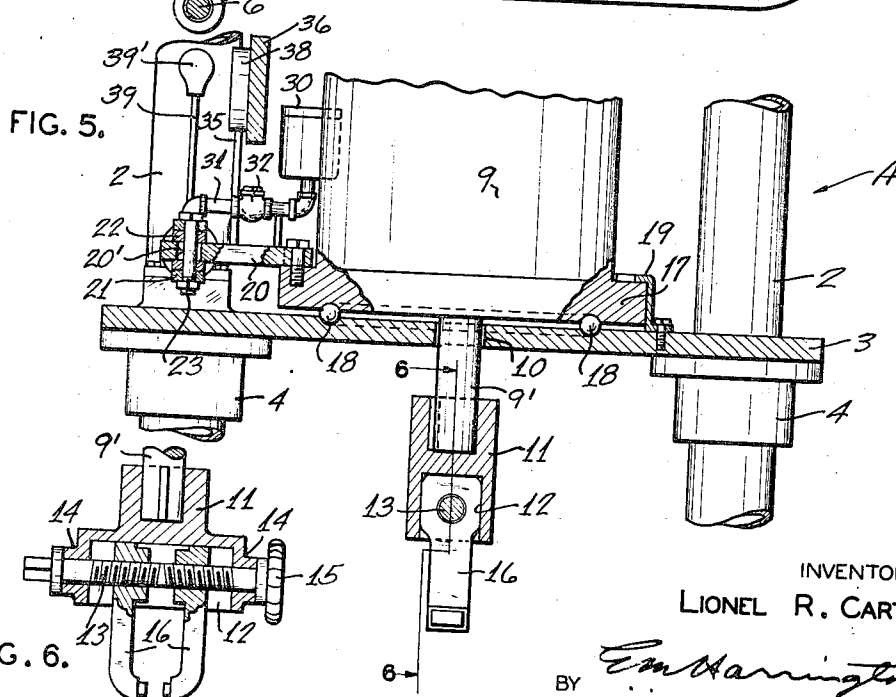
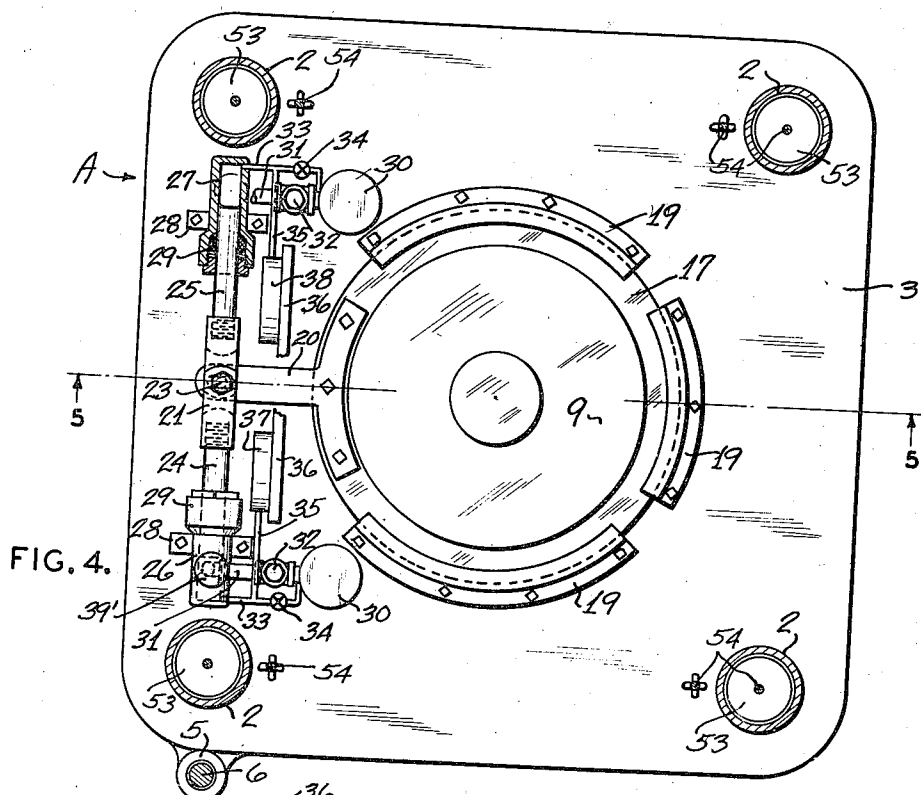
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2,216,563

VALVING MACHINE

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Application November 21, 1938, Serial No. 241,718

1 Claim. (Cl. 265—25)

This invention relates generally to valving machines and more specifically to an improved machine for applying valves to oxygen and gas cylinders and like containers, the predominant object of the invention being to provide a machine of such improved and unique construction and arrangement that the application of excessive rotative force to valves of oxygen cylinders and the like when said valves are being screwed into a seated condition in the heads of the cylinders is avoided.

As is generally known by persons familiar with such matters, the valves of oxygen and gas cylinders, and other similar containers, include screwthreaded shanks which are screwed into screwthreaded openings formed in the heads of the cylinders and containers so as to properly associate the valves with the cylinders and containers. In the past considerable difficulty has been experienced because of the absence of any efficient means for indicating to a person applying the valves to the cylinders or containers precisely when the proper and required rotative force had been applied to properly seat the valves. In other words; when valves were applied by hand by a person of great strength he frequently applied an excessive amount of rotative force to the valves and thereby rendered it possible that damage might be done to the valves or to the screwthreaded openings in which they were seated. Also when valves were applied to cylinders and containers by persons of less than normal strength the rotative force employed was often insufficient to properly seat the valves.

The improved machine disclosed herein includes indicating means which is actuated in response to the torque produced when a valve is being screwed into its seated condition, and when the indicating means indicates the attainment of a predetermined torque in the valving operation the operator will know that the valve has been properly seated with respect to the cylinder or container. Thus the disadvantages incident to the methods formerly followed are entirely eliminated and the proper seating of each valve with respect to its associated cylinder or container is assured.

Fig. 1 is a front elevation of the improved machine, a part thereof being broken away and another part being shown in section.

Fig. 2 is a side elevation of the machine illustrated in Fig. 1.

Fig. 3 is a fragmentary horizontal section taken on line 3—3 of Fig. 1.

Fig. 4 is an enlarged horizontal section taken on line 4—4 of Fig. 2.

Fig. 5 is a fragmentary vertical section taken on line 5—5 of Fig. 4.

Fig. 6 is a fragmentary vertical section taken on line 6—6 of Fig. 5.

In the drawings, wherein is shown for the purpose of illustration, merely, one embodiment of the invention, A designates the improved machine generally. The machine A includes a base 1 which supports four upright standards 2, said standards being of hollow formation as shown in Fig. 4 and being suitably secured to the base 1. Supported by the upright standards 2 for vertical sliding movement with respect thereto is a plate 3, said plate being provided with openings through which the standards extend and having secured thereto at the openings mentioned guiding members 4 which embrace the standards and serve to guide the plate 3 when it is adjusted longitudinally of the standards as will be presently explained herein.

In order to accomplish the vertical adjustment of the plate 3 relative to the standards 2 said plate has formed thereon, or affixed thereto, a vertically disposed sleeve 5 (Figs. 1 and 2) having a vertically extended screwthread opening formed therethrough. Extended through the screwthreaded opening of the sleeve 5 is an externally screwthreaded rod 6 which is suitably supported by one of the standards 2 so that it may be rotated about its axis without vertical movement of the rod. Adjacent to the lower end of the rod 6 a hand wheel 7 is provided, said hand wheel being supported by a gear housing 8 for rotary movement and the gear housing enclosing gearing (not shown) through which rotary movement of the hand wheel 7 is transmitted to the rod 6. The gear housing 8 is suitably fixed to one of the standards 2 and obviously when the hand wheel 7 is rotated with resultant rotation of the rod 6, the coaxing screwthreads on said rod and within the sleeve 5 will cause the plate 3 to be moved upwardly or downwardly relative to the standards 2 depending on the direction of rotation of the hand wheel.

Mounted on the plate 3 is an electric motor 9 of the reversing type the drive shaft 9' of which extends downwardly through an opening formed through the plate 3. At its lower end the shaft 9' of the motor 9 has fixed thereto for rotation therewith a head 11, said head being provided with a cavity 12 (Fig. 6) which is open at the bottom of the head. Extended through the cavity 12 is a rod 13 which is supported for ro-

tation by bearing portions 14 disposed at opposite ends of the cavity 12, the rod 13 being provided with right-hand and left-hand screwthreads and having an operating element 15 fixed thereto at an end thereof. Mounted on the screwthreaded portions of the rod 13 is a pair of jaws 16, the upper portions of which are slidingly disposed within the cavity 12, and obviously the jaws 16 may be adjusted toward and from each other by rotating the rod 13.

The motor 9 includes a base 17 (Fig. 5) which is disposed in parallelism with respect to the plate 3 and interposed between the motor base and the plate 3 in raceways provided therefor are ball bearings 18 which provide under certain circumstances for free rotation of the motor with respect to said plate. In order to guide the motor during such rotation arcuate guide members 19 are provided, these guide members being secured to the plate 3 and being extended upwardly into embracing relation with respect to the outwardly extended, marginal portion of the motor base. The extended marginal portion of the motor base has secured thereto an outwardly extended arm 20 which at its outer end is provided with a slot 20'.

Associated with the outer end portion of the arm 20 is a coupling device which is made up of a pair of bifurcated members 21 and 22, the legs of the bifurcated member 21 being disposed in overlapping relation with respect to the legs of the bifurcated member 22 and the outer end portion of the arm 20 being interposed between said legs of said bifurcated member 22 as shown to the best advantage in Figs. 1 and 5. In order to attach together the outer end portion of the arm 20 and the bifurcated members 21 and 22 a bolt 23 is extended through openings formed through the legs of said bifurcated members and through the slot 20' of the arm 20 as shown clearly in Fig. 5.

Attached to and extended from the bifurcated member 21 is a piston 24 and attached to and extended from the bifurcated member 22 is a similar piston 25, the piston 24 being extended into a cylinder 26 and the piston 25 being extended into a cylinder 27. The cylinders 26 and 27 are secured to the plate 3 through the instrumentality of suitable brackets 28 and said cylinders are provided with packing boxes 29 in order to provide for a fluid-tight fit around the pistons. The cylinders 26 and 27 are adapted to receive oil or other suitable fluid and associated with each of said cylinders is a reservoir 30 for the fluid medium which assures a sufficient supply of the fluid medium within the associated cylinder at all times, the reservoirs being connected to the cylinders by conductors 31 in which suitable inlet valves 32 are arranged which permit passage of fluid in one direction only; that is to the cylinders. Also leading from each cylinder is a by-pass line 33 which extends around the inlet valve 32 associated with the cylinder and communicates with the associated conductor 31 beyond the inlet valve, or, in other words at a point between the inlet valve and the reservoir. Each of the by-pass lines is provided with a valve 34 which serves to control passage of fluid therethrough. Extending from and communicating with the by-pass lines 33 are conductors 35 which lead to torque gages that are mounted on a suitable support 36, the torque gage associated with the cylinder 26 being designated by the reference character 37 and the torque gage associated with the cylinder 27 being designated by the reference character 38. It is

to be noted that the conductors 35 are connected into the by-pass lines at points between the cylinders and the valves 34 so that the associated cylinders and gages are in communication with each other at all times. Also extended upwardly from each cylinder and arranged in communication with the interior thereof is a conductor 39 which is provided at its upper end with a suitable air dome 39'.

In Figs. 1, 2, and 3 of the drawings the reference character B designates a cylinder, or other container, which is provided with a removable valve C of the type the present invention is adapted to apply and remove. In order to hold the container B in its proper position when being operated on by the machine a holding mechanism 40 is employed. The holding mechanism 40 comprises a shiftable unit 41 which is supported for sliding movement by a base element 42 which forms a part of the base 1 of the machine. The shiftable element is provided with an elongated screwthreaded opening 43 into which a screwthreaded rod 44 is extended, said rod being supported for rotary movement by an upstanding lug 45 which forms a part of the base element 42 and being provided with a hand wheel 46 for rotating the rod. Obviously rotation of the rod 44 will cause the shiftable element to be moved longitudinally of the base element 42.

The shiftable element 41 includes an upright plate portion 41' on which horizontal webs 47 are formed and these webs are provided with V-shaped recesses 47' in which the container B is seated as shown in Figs. 1 and 3. In order to secure the container B to the shiftable element 41 of the container holding mechanism 40 a chain 48 is employed. One end of the chain is engaged by spaced hooks 49 which are formed on the upright portion 41' of the shiftable element, and the opposite end of said chain is connected to a T-shaped member 50 as shown in Fig. 1. The T-shaped member 50 is attached to the piston rods of a pair of pistons 51, said pistons being arranged for reciprocatory movement in cylinders 52 to which air or other fluid is conducted by conductors such as that designated by the reference character 53 in Fig. 3. In attaching the container B to the shiftable element of the container holding mechanism the one end of the chain is caused to engage the hooks 49 whereupon fluid is introduced into the cylinders 52 to move the pistons 51 rearwardly and thereby tighten the chain about the container and hold the chain in such tightened condition as long as the required fluid pressure is maintained within the cylinders 52.

In the operation of the machine disclosed herein the plate 3 with the motor mounted thereon is elevated to permit the container B to be introduced in place in the machine. In connection with the vertical adjustment of the plate 3 it is to be noted that a weight 53 is arranged within each of the hollow, upright, standards, and a flexible element 54, which operates over a sheave 55 located at the upper end of the standard, is attached to the weight and is connected to the plate 3 so as to counterbalance the weight of the plate 3 and the parts supported thereby. When the container to be valved has been properly positioned for the valving operation by adjustment of the shiftable element of the container holding mechanism, and has been secured to the container holding mechanism 40 as previously explained, the valve engaging jaws 16 are separated by rotating the rod 13. The plate 3 is then lowered to

its proper position and the jaws 16 are adjusted inwardly to tightly engage flat faces of the valve, said valve having been previously given a preliminary start in the screwthreaded valve opening in the head of the container. The switch 56 of the motor is then operated to set the motor in operation with the result that the shaft 9' of the motor, together with the head 11 attached thereto and the associated jaws, will be rotated to screw the valve to its seated position. While the valve is being screwed toward its seated position the fluid pressure within the cylinders 26 and 27 will prevent rotation of the motor 9 with respect to the plate 3. However as the valve closely approaches its seated position resistance to the rotation of the valve is set up by the seating of the valve and the torque produced by such resistance causes the motor to rotate slightly relative to the plate 3. Rotation of the motor as described causes the piston 25 to be moved into the cylinder 27 and because the valve 34 associated with said cylinder is closed at this time the fluid within the by-pass line 33 and conductor 35 is placed under pressure whereby the indicator finger of the gage 38 is caused to swing. When the gage 38 shows that a predetermined torque has been produced the operator is advised that the proper rotative force has been applied to the valve to properly seat same and the motor is cut off. When the motor is cut off the torque is relieved and increased pressure within the cylinder 27 will restore the piston 25 and the motor to their normal positions.

When a valve is being removed from a container the jaws 16 are caused to engage the valve as previously explained and the motor switch 57 is actuated which causes the motor to be operated in the reverse direction. In the valve removing operation torque is produced at the commencement of the operation which is indicated on the gage 37 and such indication advises the operator as to the force required to unseat the valve. In other words this indication shows whether or not an excessive force was employed to seat the valve originally. In removing a valve from a container the rotation of the motor shaft 9' together with the head 11 and the jaws 16 unscrews the valves

from the screwthreaded valve opening of the container in an obvious manner.

From the foregoing it is plain that the unit of which the cylinder 27 and the gage 38 form parts is the valve seating unit, while the unit of which the cylinder 26 and the gage 37 form parts is the valve unseating unit. When a valve is being seated with the aid of the machine the valve 34 associated with the cylinder 27 is closed while the valve 34 associated with the cylinder 26 is open. Likewise when a valve removing operation is being performed by the machine the valve 34 associated with the cylinder 26 is closed and the valve 34 associated with the cylinder 27 is open. The purpose of the air domes 39' is to provide a cushioning effect when the fluid within the cylinders 26 and 27 and within the conductors associated therewith is placed under pressure during operation of the machine.

While the description of the device refers specifically to the seating and unseating of valves having left-hand screwthreads, the device obviously may be employed in seating or unseating valves having either left-hand screwthreads or right-hand screwthreads.

I claim:

A valving machine comprising valve-engaging means, a reversible motor for rotating said valve-engaging means, a support on which said motor is mounted for rotary movement as a unit in either direction, and a pair of indicating units operated by fluid pressure and actuated in response to rotary movement of said motor resulting from torque produced when a valve is seated or unseated for indicating through operation of one or the other indicating unit the rotative force required to seat or unseat the valve, said pair of indicating units including a pair of fluid cylinders, pistons adapted to be moved by rotation of the motor inwardly of said cylinders so as to place fluid within the cylinders under pressure, and pressure-indicating gages arranged in communication with said cylinders, the fluid pressure which serves to operate said indicating units acting also to normally resist rotary movement of said motor.

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