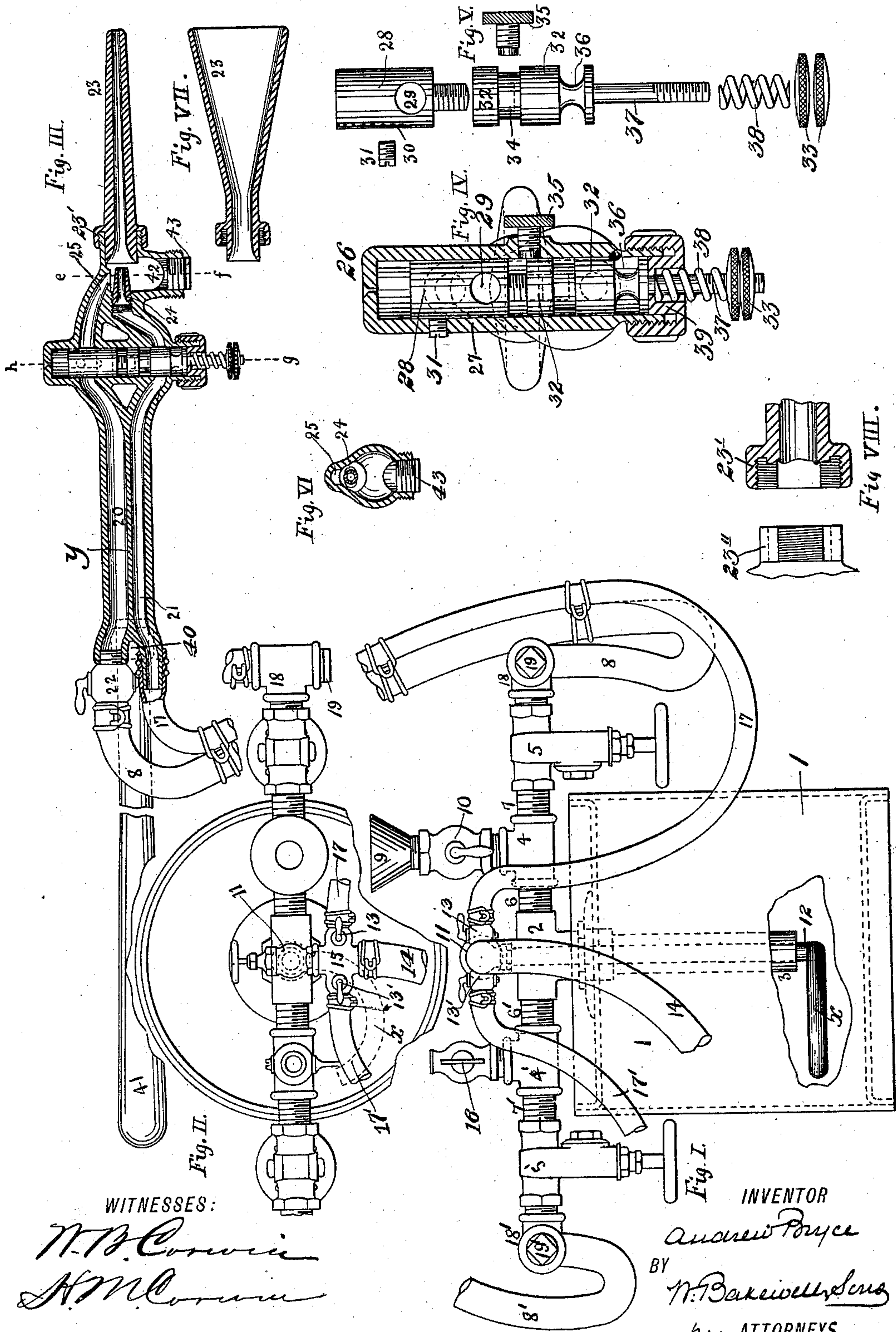


(No Model.)

A. BRYCE.
PAINTING APPARATUS.

No. 561,483.

Patented June 2, 1896.



WITNESSES:

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PAINTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 561,483, dated June 2, 1896.

Application filed December 10, 1894. Serial No. 531,331. (No model.)

To all whom it may concern:

Be it known that I, ANDREW BRYCE, of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Painting Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is an elevation of the supply-tank and its attachments. Fig. 2 is a top view of the same. Fig. 3 is a view, partly in section, of the air and liquid supply pipes, together with the valve for regulating the supply to the discharge-nozzle. Fig. 4 is an enlarged vertical section of the regulating-valve shown in Fig. 3 on the line *g h* thereof. Fig. 5 is a detailed view of the parts of the valve shown in Fig. 4. Fig. 6 is a cross-section on the line *e f* of Fig. 3. Fig. 7 is a cross-section of the discharge-nozzle of the paint-machine, represented at right angles to the similar part shown in Fig. 3. Fig. 8 is a sectional representation of the hose and nozzle couplings; and Fig. 8^a is a view similar to Fig. 8, excepting that the parts are connected together and shown at right angles to the position of Fig. 8.

Like symbols of reference indicate like parts in each figure.

In the drawings, Fig. 1, a tank 1 is constructed of any desired size and shape and is preferably made of iron. It should be made to be air-tight and capable of sustaining an internal pressure of from thirty-five to one hundred pounds to the square inch. Into the cover of the tank is inserted a T or three-way pipe connection 2, the T-head of which may be horizontal, as shown in the drawings, and into this is screwed a vertical pipe 3, which extends down nearly to the bottom of the tank 1. This pipe 3 and its connection with the T-head 2 are shown in dotted lines, excepting where the side of the tank is broken away to show the interior. On each side of the T-head 2 extends a tubular passage composed of a T-head 4 and two-way screw-valve 5, with screw connections 6 and 7, on one side of the T-head 2, and T-head 4' and two-way valve 5', with screw connections 6' and 7', on the other side, and terminating at each

end with a flexible hose 8 on one side and 8' on the other side, the arrangement on each side of the T-head 2 being a duplicate of that on the other side, excepting that one of the T-heads has a funnel 9 for introducing into the tank the liquid paint or coloring-matter, which passes through the T-heads 4 and 2 and down the vertical pipe 3 into the tank, the valves 5 and 5' being closed while the tank is being supplied with painting material and the cock 10, below the funnel, which is screwed into the T-coupling, being open, and the other T-coupling 4' is furnished with a valve or cock 16 as an air-vent from the tank when it is being filled.

On top of the T-head 2 is placed an angle-cock 11, by which is regulated the amount of compressed air admitted into the tank through the descending air-pipe 12, which passes downward through the vertical pipe 3. After passing below the bottom of pipe 3 the descending air-pipe 12 is curved, as shown at *x* in Fig. 2, the effect of which is to cause a swirling motion of the contents of the tank. This arrangement is especially advantageous when the liquid to be ejected or sprayed contains matter which is liable to be deposited on the bottom of the tank, as the passage of compressed air upward through the contents of the tank (which may be made constant by leaving the valve 11 slightly open) and the swirling motion caused by the curvature of the air-pipe tend to prevent such deposition of solid matter.

The tank, when supplied with liquid paint or coloring-matter, is not filled to the top, space being left for compressed air above the surface of the liquid, in order to force it through the apparatus when the cocks 13 and 13' are open. This compressed air is admitted by pipe 14 from a reservoir of compressed air (not shown) or air-pump located in any convenient place. When the compressed air is introduced into the tank, the valve 11 is open and the cocks 13 and 13' closed. The valve 11 regulates the pressure of compressed air in the tank, so as to make it constant, by leaving the cock slightly open whenever the apparatus is in use.

At one side of the angle-cock 11, as shown

in Fig. 2, is a four-way connection 15, which is connected with the angle-cock 11, with the compressed-air pipe 14, and with the two flexible hose-pipes 17 and 17', through which the compressed air passes to the delivering or spraying device hereinafter described. The cocks 5 and 5' serve to connect or disconnect the delivering device from the paint supply or to regulate the amount of discharge, as may be desired.

From the above description it will be seen that the compressed air entering the tank 1 by the pipe 14 not only passes through the pipes 17 and 17' to effect the spraying of the liquid paint or coloring-matter, but also by pressing on the surface of the liquid paint forces it upward through the vertical pipe 3 and through the horizontal feed-pipe on top of the tank, composed of the couplings and screw connections 4, 6, and 7, into the delivering-pipe 8, and through the couplings and connections 4', 6', and 7' into the delivering-pipe 8', either or both of them, as may be desired, and determined by the valves 5 and 5', respectively.

At each outer extremity of the horizontal feed-pipe just referred to is a T 18 18', to which the hose-pipe 8 or 8' is connected, and at the other end of each T 18 18' is inserted a screw-plug 19, by removing which an additional paint-discharge pipe 8 may be attached and the capacity of the machine increased, and other similar connections of independent spraying devices may be in like manner added, so that a number of operators may be supplied with painting apparatus all simultaneously fed from the same paint-tank.

Each paint-pipe 8 and air-pipe 17 may be, for convenience, connected by a wire or other fastening, as shown in Figs. 1 and 3.

In Fig. 3 is shown, partly in section, the painting device or paint-distributor and its connection with the paint-hose 8 and the air-hose 17.

The paint-distributor may be conveniently constructed of metal, and consists of two pipes united together, or preferably made in one piece, the double passage-way (one for paint and the other for air) being formed by means of a web *y*, as shown in Figs. 3 and 18. One division 20, being larger in diameter than the other, is attached by the valved connection 22 to the extremity of the paint pipe or hose 8, and the other division 21 is attached to the compressed-air pipe 17, as shown in Fig. 3.

At the outer end of the paint-distributor is screwed a nozzle 23, preferably made with a passage gradually tapering internally in one direction, as shown in Fig. 3, and more rapidly widening in the other direction, as shown in Fig. 7, so as to deliver the liquid paint in a thin wide sheet.

At the rear end of the nozzle 23, where it is screwed to the outer end of the paint-distributing pipes, the orifice is tapering or cone-shaped (see Fig. 3) in one direction, and immediately back of it, at the end of the air-

passage, is placed a small injector-nozzle 24, which is longitudinally adjustable, and the bore of which is directly in line with that of the nozzle 23, so as to atomize and spray the paint into the nozzle 23, and also by suction to draw the paint rapidly through the somewhat-contracted orifice 25 at the outer end of the paint-passage 20, the effect of this construction being to expel the liquid paint with considerable force.

Back of the injector-nozzle 24, and passing through both the paint and air passages 20 and 21 of the paint-distributor, is a valve 26 to regulate the discharge of the paint as to quantity, positive as well as relative, with the greatest nicety at the will of the operator. The paint-distributor is enlarged at the place where this valve is situate, so as to permit of the proper action of the valve. This valve (marked 26) in Fig. 3 is shown in detail and enlarged in Figs. 4 and 5. The sides of the combined paint and air pipes form a continuous case 27 for the valve. The valve shown in separate pieces in Fig. 5 consists of a cylindrical plug 28 at the upper end, with a circular perforation 29, which in a certain position of the valve-stem registers with the paint-passage 20. This cylindrical plug has a groove 30 at one side to receive the end of a screw 31, which, passing through the valve-case 27, keeps the plug 28 in place. This plug 28 screws through the upper end of the lower half 32 of the valve, so that it may be adjusted in such a way that when the valve is raised by pressing on the jam-nut 33 the passages through the valve may more or less accurately register with the paint and air passages 20 and 21, respectively, and thus adjust the proportionate amount of paint and air allowed to pass. The lower half 32 of the valve is also a cylindrical plug fitting the case 27, and has a groove 34 into which the screw 35 may enter. The purpose of this arrangement is that by tightening the screw 35 the plug-valve 32 may be rotated on its axis instead of being moved vertically, and thus draw up or down the paint-supply plug 28 without raising or lowering the plug 32, which is set by the screw 35, and thus without varying the air supply around the circular groove 36.

At the lower end of the plug 32 is cut a semicircular groove 36, which when it registers with the air-passage 21 allows the air to pass to the injector-nozzle 24. At the lower end of the valve is a stem 37, extending downward, with a screw-thread at its extremity on which the jam-nuts 33 are screwed. On the lower end of the valve-case 27 a cap and gland are screwed, which enter the bore of the valve-case and regulate the downward throw of the valve. A spiral spring 38 on the stem 37 of the valve is interposed between the gland 39 and the upper jam-nut, so that it retracts the valve downward when released after being raised. By means of this valve, which is located near the orifice of the paint-distributor and is grasped by the hand of the operator,

the flow of air and of paint, relatively as well as positively, can be regulated at pleasure with the greatest ease.

To the inner end of the combined paint and air pipes 20 and 21 is attached a sleeve 40, in which is inserted the handle 41 of the painting device, which the operator uses when necessary.

Below the injector-nozzle 24 is an orifice 42 to the outside, through which sand or other matter, solid or liquid, may be drawn by the vacuum caused by the passage of air through the nozzle and discharged either by itself or mixed with the paint as it is discharged. A screw-plug 43 is used to close this orifice when it is not needed.

Fig. 8 illustrates a convenient device for rapidly connecting and disconnecting the nozzle 23 from the apparatus. 23' represents the inner end of the nozzle, having a cup-shaped end internally screw-threaded, and 23'' represents the end of the pipes 20 and 21 on which the nozzle is screwed. The screw-threads on both are cut away at corresponding points of the circumference, so that they can be joined by simply putting one into the other. The nozzle-piece is then turned about a quarter-turn, and all of the screw-threads engage together just as if they had been screwed together in the usual way.

I have described the use of my apparatus for painting as operated by means of compressed air; but it is equally adapted to be used with steam, unless the coloring-matter should be soluble in hot water, in which case the use of steam would have the effect of gradually diluting the painting mixture.

The device may also be employed for other than painting purposes, and many minor variations may be made in it by the skilled mechanic without departing from my invention.

Having thus described my improved apparatus, what I claim is—

1. The combination with an air-tight tank for holding a liquid, of an outlet-pipe projecting downwardly thereinto, and a compressed-air pipe extending downwardly through the interior of the outlet-pipe, said inner pipe being curved at the lower end to give a swirling motion to the liquid, substantially as described.

2. The combination with a pipe having two substantially parallel passages therein, of a transverse valve arranged to control both passages, said valve being composed of adjustable parts so as to regulate the proportion of fluid through the passages: substantially as described.

3. The combination with the two passage-pipes, or connected air and liquid pipes, for the outward passage of the matter to be ejected, of an injector-nozzle between the outward end of the air-pipe and the ejector-nozzle of the apparatus, said nozzles having their orifices

substantially in line with each other, and an adjustable regulating-valve in the rear of said nozzles and controlling both passage-pipes for the purpose of varying the force of ejection as well as the amount of matter ejected at the will of the operator.

4. The combination with the two passage-pipes, or connected air and liquid pipes, for the outward passage of the matter to be ejected, of a longitudinally-adjustable injector-nozzle between the outward end of the air-pipe and the ejector-nozzle of the apparatus, said nozzles having their orifices substantially in line with each other, and an adjustable regulating-valve in the rear of said nozzles and controlling both passage-pipes for the purpose of varying the force of ejection as well as the amount of matter ejected at the will of the operator.

5. A case (the interior of which is preferably cylindrical in cross-section) having separate orifices for the passage of the separate matter to be regulated, and a cylindrical plug-valve fitting in said case and having as many orifices or passages as there are in the case, and at the same distance apart, said valve being capable of sufficient vertical motion to allow the passages of the plug-valve to be brought into and out of register with the corresponding passages of the valve-case; a screw-cap at the lower end of the valve-case, through which the stem of the valve passes, and on which the lower end of the valve rests; and a spiral spring on the stem of the valve, interposed between the screw-cap and a knob or nut at the end of the valve-stem; substantially as described.

6. A case of cylindrical interior shape, having separate orifices for the passage of the separate matters to be regulated; a cylindrical plug-valve fitting within the valve-case, said plug-valve consisting of two cylindrical pieces, connected together axially by a screw, so as to be adjustable toward or from each other, one of said cylindrical valve-pieces having a groove, preferably semicylindrical, for the passage of the matter to be regulated, and the other having a passage at right angles to its axis, and having a feather or pin to prevent its rotation on its axis, and a stem extending outside of the valve-case for operating the valve, so that the passages of the valve-pieces may not only be brought into or out of register with the passages in the case, but that by changing the relative position of the passages in the valve, the relative size of the passages may be varied; substantially as described.

In testimony whereof I have hereunto set my hand.

ANDREW BRYCE.

Witnesses:

W. B. CORWIN,
H. M. CORWIN.