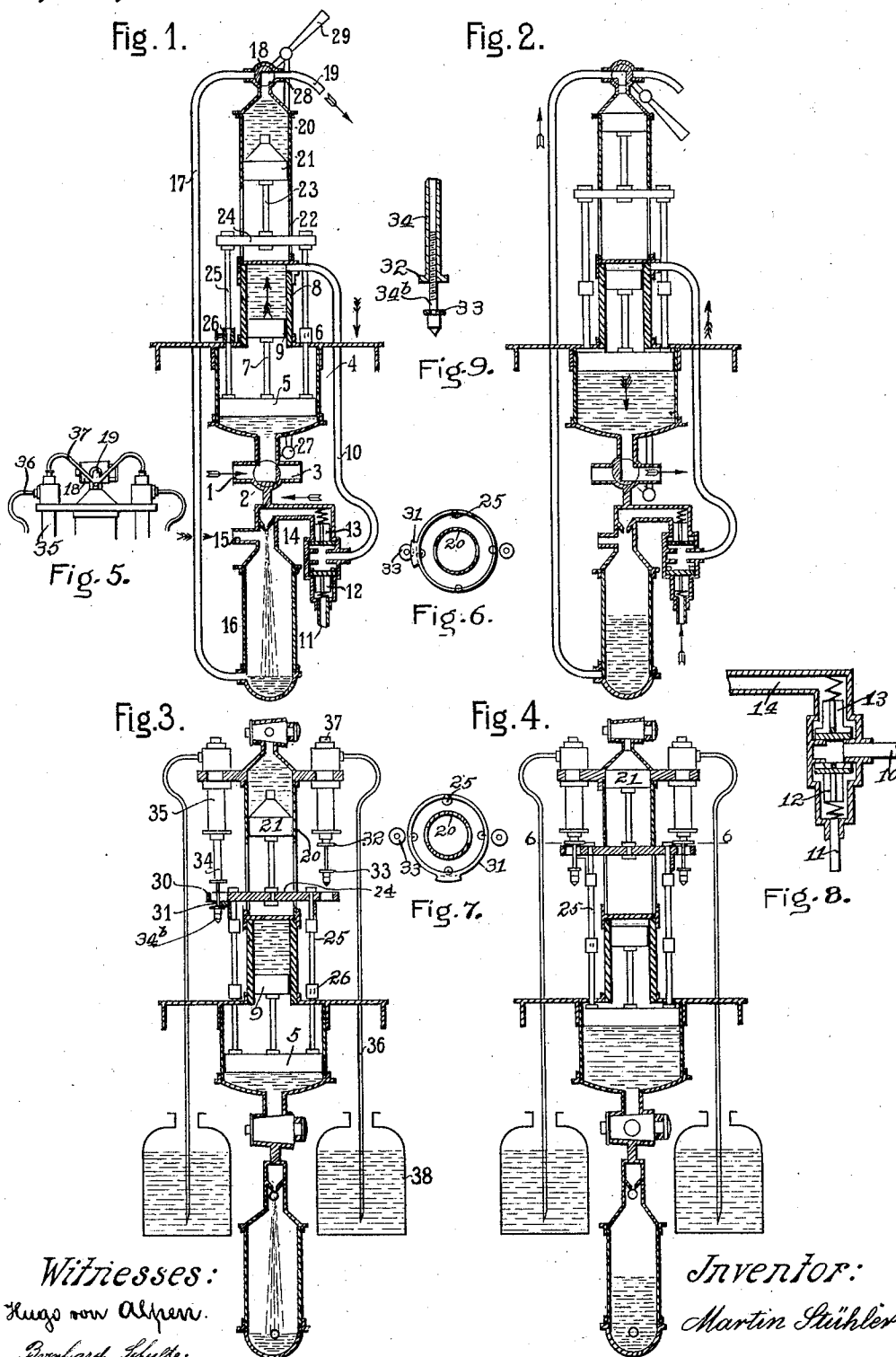


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 APPARATUS FOR THE AUTOMATIC MANUFACTURE AND DIRECT SUPPLY OF AERATED BEVERAGES.
 APPLICATION FILED APR. 6, 1909.

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UNITED STATES PATENT OFFICE.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, MARTIN STÜHLER, a subject of the German Emperor, and resident of Cologne, Germany, have invented certain new and useful Improvements in Apparatus for the Automatic Manufacture and Direct Supply of Aerated Beverages, of which the following is a specification.

This invention relates to improvements in apparatus which by the mixing of carbonic acid and water automatically makes aerated water and by the addition of mineral salt solutions or fruit syrups mineral water or effervescent lemonade or the like are obtained according to choice, and discharged directly into drinking vessels for use.

The essential features of the invention may be briefly set forth as follows: In a suitably connected cylinder is arranged a suitably connected piston which is subjected alternately, in one direction to water pressure supplied through a suitable conduit, and in the opposite direction to the pressure of the finished carbonated-water coming from the mixing chamber under gas pressure. This alternate loading and unloading on either side is accomplished through a three-way control which is combined through a common drive with another three-way control. By the intermittent impulses developed in this manner, the piston system simultaneously advances the water intended for use, into the mixing chamber filled with carbonic acid gas, where saturation takes place. Furthermore these impulses of the piston system are employed for the automatic mixture of the mineral salt solutions and fruit juices, inasmuch as the pistons or the special annex pumps will be coupled with the piston system according to choice. With the one stroke therefore, the pressure water acts against the piston system to expel the finished carbonated-water into the drinking glass and by the other stroke, the finished carbonated water standing under the gas pressure, acts against the piston system to expel the pressure water. The apparatus is thus a double acting engine although with the special feature that the driving medium on the two sides is separated. And the effect of this engine is

to advance the water for use into the mixing chamber as well as to drive the selectively coupled annex pumps.

The essential feature of the present invention consists in an improved and peculiar combination of three cylinders and three pistons, of which one is intermittently acted on by the water from the main, and the second intermittently and in an opposite direction acted upon by the finished aerated water, while the third conveys the water intended for use into the mixing vessel.

In the accompanying drawings:—Figure 1 shows diagrammatically in vertical, central section one embodiment of the invention in its simplest form. Fig. 2 is a similar view to Fig. 1 with the valves and pistons in different positions; Fig. 3 shows similarly in vertical section another embodiment of the invention, being in all respects the same as Fig. 1 but with addition of auxiliary pumps and the section taken at right angles to the plane of the section of Fig. 1; Fig. 4, same section as Fig. 3 but with the valves and pistons in different position; Fig. 5 is an elevation of the upper part of Fig. 3, indicating the connection of the pressure pipe of the auxiliary pumps with the by-pipes; Fig. 6, a section on line 6—6 of Fig. 4 showing the adjustable catch in engagement with an auxiliary pump and Fig. 7, the same section with the parts out of engagement. Fig. 8 a detail view of valves 12 and 13 shown at rest and in enlarged scale; Fig. 9 a detail view of a pump rod and disks.

All parts not strictly belonging to the invention are omitted. The devices for charging the water are only indicated. For the sake of greater clearness, the cocks 2 and 18 of the apparatus have been shown as plug cocks and the connecting pipes are all placed in one central plane.

The simplest form of the apparatus is shown in Figs. 1 and 2. The two cylinders 4 and 8 are connected by the annular perforated intermediate plate 6, and the two pistons 5 and 9 by a piston rod 7 common to both. The cylinder 20 is mounted on the cylinder 8 and provided with longitudinal slots 22 through which a symmetrically

shaped cross support 24 passes. This cross support is connected in the middle with the piston rod 23 of the piston 21 and at the ends with the rods 25 which are guided in the plate 6 and fixed in the piston 5. The apparatus thus substantially consists of three rigidly connected pistons 5, 9 and 21 which move in three fixed cylinders 4, 8 and 20. This system of pistons is governed by means of two three-way cocks 2 and 18, which are so connected by means of parallelly placed cranks 27 and a rod 28, that both are simultaneously moved by one handle 29. The three-way cock 2 connects the lower cylinder 4 alternately with the water main 1 or with the outlet passage 3. The three-way cock 18 connects the upper cylinder 20 alternately with the outlet passage 19 or with the mixing vessel 16. The middle cylinder 8 is connected by means of a connecting passage 10 with the suction pipe 11 and the pressure pipe 14. The suction pipe through which the water from the main enters is provided with a suction valve 12, and the pressure pipe through which the water of the main reaches the mixing vessel 16 is provided with a pressure valve 13. These two valves 12 and 13 are of well known construction and need therefore not here be described. The combined action of the valve spring and the gas pressure in the mixing vessel 16 is sufficient to keep valve 13 closed when water from the main enters through pipe 11. Adjustable stops 26 are provided on the bars 25 by which stops the lift of the pistons is limited and the quantity of water entering the mixing vessel determined.

The mode of action of this simplest form of the apparatus is as follows:—If the handle 29 be brought into the raised position shown in Fig. 1, the upwardly directed pressure stroke commences. The three-way cock 18 closes the connecting passage 17 leading from the mixing vessel 16 to the discharging cylinder 20 and opens the discharging passage 19. The three-way cock 2 closes the outlet passage 3 and connects the lower larger cylinder 4 with the water pipe 1. The pressure of the water of the main acts on the lower piston 5, and is communicated to the middle piston 9. This water pressure overcomes the pressure of the gas coming from the pipe 15. The piston system rises, the suction valve 12 closing and the pressure valve 13 opening and the water passes into the mixing vessel 16 where it is charged. Simultaneously the aerated water contained in the discharging cylinder 20 is poured slowly and uniformly through the outlet passage 19 into the drinking cup. The desired addition of salt or syrup having preferably been previously poured into the drinking cup. If the handle 29 be brought into the lowered position shown in Fig. 2,

the downwardly directed suction stroke commences. The three-way cock 2 closes the water pipe 1 and connects the lower cylinder 4 with the outlet passage 3. The three-way cock 18 closes the outlet pipe 19 and opens the connecting passage 17 leading from the mixing vessel 16 to the discharging cylinder 20. The finished aerated water passes into the discharging cylinder 20, acts on the piston 21 and forces the piston system downward, the lower cylinder 4 being discharged and the middle cylinder 8 again filled.

The form of construction shown in Figs. 3 and 4, differs from this simplest form of the apparatus only by the additional device for supplying salts or syrups, after a suitable adjustment has taken place, automatically through separate auxiliary pumps, the pistons of which are selectively coupled with the main piston arrangement by means of connecting catches. The auxiliary pumps 35 are arranged around the axis of the main cylinder system at equal distances apart therefrom, and connected by the suction pipes 36 to the syrup container 38 and by pressure pipes 37 with the discharge pipe 19, Fig. 5. The cross support 24 has several fixed annular catches 30 surrounding the piston rods 34 of the auxiliary pumps 35 and has also a revoluble catch 31 adjustable to engage any one of the pumps, which catch is located beneath the fixed catch, formed as a ring with projecting edge and provided with numbers or names of the separate fluids to be added. The piston rods of the auxiliary pumps are each provided with two disks 32 and 33 of which the upper one is larger and the lower one smaller than the corresponding hole in the fixed catch. While the apparatus is stationary on completion of the upwardly directed pressure stroke, the catches 30 and 31 stand between the disks 32 and 33. Now if the revoluble catch 31, see also Figs. 6 and 7, is adjusted to any of the auxiliary pumps, the smaller disk 33 of this auxiliary pump on the downwardly directed suction stroke of the main piston system is engaged by the projecting edge and drawn down, whereby the liquid to be added is drawn up. On the upwardly directed pressure stroke of the main piston system the larger disk 32 of this auxiliary pump is engaged by the corresponding fixed catch 30 and again forced upward, thus causing the added liquid to be discharged simultaneously with the aerated water. The other pistons of the auxiliary pumps can in the meantime not alter their position because they are retained by the suction action of the column of liquid and because the smaller disks 33 cannot be encountered by the fixed catches 30.

The upper larger disks 32 are firmly

mounted on the piston rod. The lower smaller washers or disks 33 rest loosely on the annular thickened lower ends of the rods which latter may be displaced and fixed in the hollow upper part of the piston rods 34 and the disks 33 are upwardly displaceable on the lower part of the pistons in order that no damage to the apparatus may take place if the revoluble catches 31 by error are turned when the main piston system is in the lower position, whereby a smaller disk 33 might be engaged from beneath and pushed forcibly upward. In the upwardly directed pressure stroke the lower piston 5 and in the downwardly directed suction stroke the upper piston 21 is the propelling one. The middle piston 9 is therefore always driven and the water intended for use may be drawn from a container through the pipe 11.

The piston 21 has the shape of the cylinder cap and approaches the latter in the raised position to within a very small distance in order that the water left in the discharging cylinder 20 may be reduced to a minimum. The discharging cylinder 20 is somewhat wider than the pump cylinder 8. There is therefore, always a somewhat smaller quantity driven into the mixing vessel 16 and from this conveyed into the discharging cylinder, than the latter can actually receive, because the stroke of the connected pistons is equal. The result is therefore attained that at each full stroke the mixing vessel is discharged to the level of the outlet aperture and a gas space is formed in the discharge cylinder above the aerated water, which allows the necessary expansion of the water, which froths up on the termination of the pressure. These operations do not alter, even if the mixing vessel be suitably enlarged and the outlet aperture arranged so that a given quantity of water permanently subjected to the action of the carbonic acid always remains, which is always again mixed with freshly entering water and gradually given off in proportion to the resulting mixture.

The following effects are obtained by this invention:—

Firstly the automatically mixed beverages are discharged directly from the apparatus in good and attractive condition.

Secondly this apparatus shows a very high production.

Thirdly this apparatus may draw the water required for use directly out of open containers. Filtered or distilled or sterilized water or water treated in any other suitable way may therefore be employed for making the beverages.

Fourthly in this apparatus the movement of the system of pistons may be interrupted at any point of its stroke, and therefore lim-

ited not only to a determined maximum extent but also any suitable minimum.

Fifthly in this apparatus no excess of water in the mixing vessel can ever result and consequently the mixing apparatus never becomes ineffective.

Sixthly this apparatus has the advantage that the liquids to be added are mixed with the aerated water not only automatically but also in uniform proportionate quantities.

I claim:—

1. An apparatus for automatically manufacturing and directly supplying aerated beverages consisting of a mixing vessel three connected cylinders and three connected pistons for said cylinders, the first cylinder being connected with a water supply and a water outlet, a three-way controller for said supply and outlet, the second cylinder being connected with an aerated water supply leading from said mixing chamber and an aerated water outlet, a three-way controller for said last mentioned supply and outlet, and the third cylinder being connected with a suction inlet for the water used, a valve for the suction inlet, a pressure pipe leading to the mixing chamber and a valve for the pressure pipe, substantially as described.

2. In an apparatus for the automatic manufacture and direct supply of aerated beverages, the combination of a mixing vessel having a gas inlet, three cylinders and three pistons for said cylinders, the cylinders and the pistons being respectively firmly connected with each other and arranged vertically one above the other, a three-way cock for one of the end cylinders, said cock in one position supplying pressure medium to said end cylinder, whereby the piston system will receive its outward stroke; and said cock, when set in another position discharging the pressure medium from said end cylinder; a second three-way cock for the other end cylinder and positive driving connection between said cocks and a connecting pipe between said mixing vessel and said second cock whereby aerated water will be discharged through said second cock from said second end cylinder when said first mentioned cock stands in its first mentioned position, while, with the cocks reversed aerated water will be supplied to said second end cylinder from said mixing vessel through said connecting pipe and said second cock; whereby said piston system will be caused to run its inward stroke and fresh water simultaneously be drawn into the intermediate cylinder through a valve controlled supply pipe; said intermediate cylinder having valve controlled pipe connection with said mixing vessel, whereby water from the intermediate

cylinder will be furnished said mixing vessel during the outward stroke of said piston system.

3. In an apparatus for an automatic manufacture and direct supply of aerated beverages, the combination of a mixing vessel having a gas inlet, three cylinders and three pistons for said cylinders, the cylinders and the pistons being arranged vertically one above the other, the lowermost cylinder being of greater diameter than the uppermost cylinder and the uppermost cylinder being of somewhat greater diameter than the intermediate cylinder the piston of the greatest diameter having positive driving connection with each of the other pistons, and pipe connections between said mixing vessel and said two smaller cylinders respectively.

4. In an apparatus for the automatic manufacture and direct supply of aerated beverages, the combination of a plurality of cylinders and pistons therein, a mixing vessel having a gas inlet, the system of pistons being governed by means of three-way cocks simultaneously movable by one handle, the cocks being connected by means of parallel cranks and a connecting rod, and one of said pistons having positive connection with each of the other pistons, said mixing vessel having pipe connection with two of said cylinders for receiving water from the one and delivering gas and water mixed to the other of said cylinders.

5. In an apparatus for the automatic manufacture and direct supply of aerated beverages, the combination of a plurality of cylinders mounted in alinement one above the other and pistons therein, the upper cylinder being provided with longitudinal slots, a symmetrically shaped cross head mounted to slide in said slots, the piston rod of the piston movable in the upper cylinder being secured to said cross head and rod connection between the cross head and the lowermost piston and the piston rod of the next lowest piston being secured to said lowermost piston.

6. In an apparatus for the automatic manufacture and direct supply of aerated beverages, the combination of a mixing vessel having a gas inlet, a plurality of cylinders and a plurality of pistons therein, with separate auxiliary pumps adapted to supply additional liquids, the pistons of the pumps adapted to be selectively coupled by an adjustable catch coupler with the main piston system and suitable valve and pipe connections between the mixing vessel, the cylinders and the pumps for receiving water, mixing it with gas and other ingredients and dispensing the so prepared beverage.

7. In an apparatus for automatic manufacture and direct supply of aerated beverages, the combination of a plurality of cyl-

inders and a plurality of pistons therein with separate auxiliary pumps arranged around the axis of the main cylinder system and at equal distances therefrom, each of the pistons of the pumps being constructed to be selectively coupled by an adjustable catch coupler with the main piston system, substantially as described.

8. In an apparatus for automatic manufacture and direct supply of aerated beverages, the combination of a plurality of cylinders and a plurality of pistons therein, with separate auxiliary pumps arranged around the axis of the main cylinder system and at equal distances therefrom, the pistons of the pumps being constructed to be coupled respectively by an adjustable catch coupler with the main piston system, the adjustable coupler having the form of a ring concentrically embracing the main cylinder system and provided with a projecting annular piece, which ring is revolvably mounted on a bearing rigidly connected with the main piston system whereby said pumps may selectively be made to cooperate with said cylinder pistons for supplying the beverage, substantially as described.

9. In an apparatus for automatic manufacture and direct supply of aerated beverages, the combination of a mixing vessel having a gas inlet a plurality of cylinders and a plurality of pistons therein, with separate auxiliary pumps arranged around the axis of the main cylinder system and at equal distance therefrom, adjustable disks being arranged on the pump rods, whereby the stroke of the piston of the auxiliary pump may be adjusted, substantially as described, and suitable valve and pipe connections between said mixing vessel, said cylinders and said pumps respectively, whereby water can be drawn into the apparatus, mixed with gas and other ingredients, and the prepared beverage delivered for consumption.

10. In an apparatus for the automatic manufacture and direct supply of aerated beverages, the combination of a mixing vessel having a gas inlet, a pressure driven piston, and means for supplying pressure medium, a discharge cylinder and a supply cylinder, each having a piston and said pistons being in alinement with and positively connected with said pressure driven piston, the latter piston adapted to drive the other pistons in one direction, whereby water is delivered from said supply cylinder to said mixing vessel and the prepared beverage simultaneously discharged from said discharge cylinder for consumption; a valve controlled inlet pipe to said supply cylinder, a pressure pipe for passing the water into said mixing vessel from said supply cylinder and a valve in said pressure pipe pre-

venting backflow; pipe connection between
said mixing vessel and said discharge cylin-
der for delivering the aerated water from
said mixing vessel into said discharge cylin-
5 der and a three-way valve in the latter for
controlling alternately said delivery and dis-
charge of the aerated water; said aerated
water in the discharge vessel causing the re-
turn movement of said three pistons; hand
10 operated means in positive connection with
said three-way valve for changing synchro-

nously the position of said valve and said
means moving therewith to deliver and dis-
charge pressure medium against one side of
said pressure driven piston.

The foregoing specification signed at Co-
logne-on-the-Rhine, Germany, this 19th day
of March, 1909. 15

MARTIN STÜHLER.

In presence of—

LOUIS VANDORY,
H. STELZER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."
