

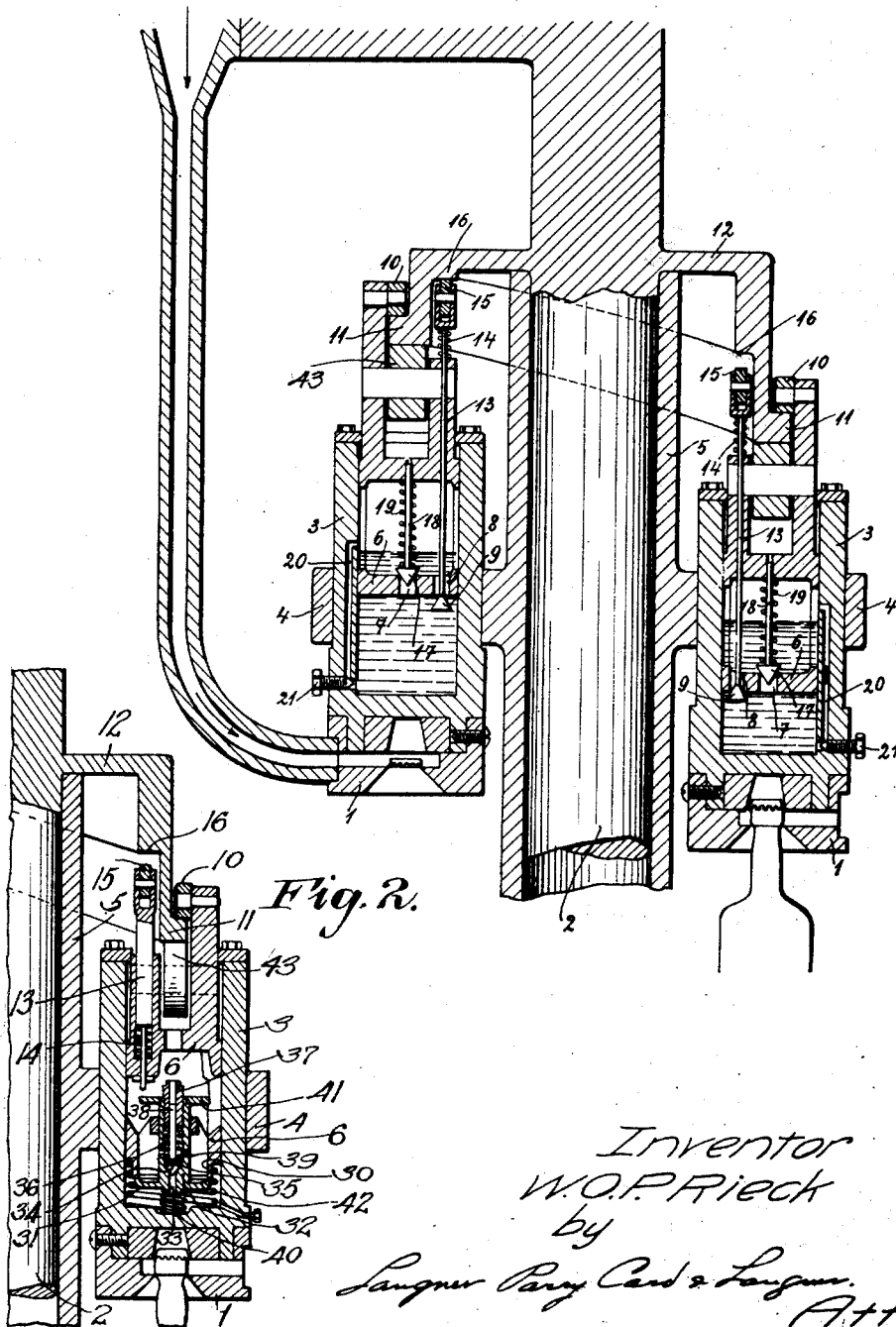
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BOTTLE STOPPERING MACHINE

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Fig. 1.



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BOTTLE-STOPPERING MACHINE.

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This invention relates to bottle-stoppering machines and more particularly to crown-cork-stoppering machines in which differences of level of the bottles are compensated for hydraulically by means of displacer pistons movable in the axial direction of the bottles.

In machines of this kind heretofore known the operation of the displacer piston disposed beneath the bottle carrier was such that it maintained the latter at a predetermined elevation only so long as the pressure exercised on the bottle head when corking or stoppering the bottle did not exceed the predetermined amount. In other words, the equalization of the levels was effected at the commencement, during or after the stoppering operation, and was associated with the drawback that for the commencement of the compensating movement an increase of the pressure on the bottles was essential—which in certain circumstances, in cases of defective operation of the parts which limit the extent of this increase of pressure, may occasion breakages of bottles and other drawbacks.

As distinguished from prior proposals, according to the invention the compensation for differences in level is effected before the stoppering pressure proper is applied. Since at the time the stoppering pressure is applied the correct adjustment has already been effected there is no risk of damaging bottles on account of excessive increase of pressure. This result is obtained by reason that the overflow port for the liquid displaced by the piston is arranged to be closed by a valve controlled to close just before the stoppering operation proper. Preferably the compensating device is incorporated in the stoppering head, though it may be incorporated in the bottle carrier. In the former case the telescopically movable stoppering head descends with unimpeded displacement of the liquid until it bears on the neck of the bottle irrespective of the elevation of the latter and only shortly before the stoppering pressure is applied the overflow port is positively closed so that now the displacer piston and the associated cylinder are positively coupled in the direction of pressure, in that the liquid contained in the closed space constitutes a rigid connection between the piston and the cylinder. The descent of the stoppering head is effected by means of a cam disc which

is also formed with a cam face for positively controlling the over-flow valve.

In the accompanying drawing there is illustrated, by way of example, a machine comprising a plurality of stoppering heads 60 with a like number of bottle carriers arranged for rotation synchronously therewith around a vertical axis, it being understood that the invention is equally applicable to machines for corking or stoppering a single bottle employing a single vertically movable bottle carrier or stoppering head.

Fig. 1 is a vertical section of one embodiment illustrating the essential elements.

Fig. 2 is a similar section showing a modification.

Referring to Fig. 1, the stoppering heads 1 of usual construction, in the present case six in number are mounted for rotation around a central vertical axis 2. The stoppering members proper are each attached to a cylinder 3 movable in a bearing lug 4. The several bearing lugs are integral with a sleeve 5 rotatable around the axis 2. Mounted for movement within the cylinder is a displacer piston 6 having a central overflow port 7 and an eccentric overflow port 8 which latter is controlled by a conical valve 9. The piston is suspended by means of a roll 10 from a cam track 11 on a disc 12 concentric with the axis 2, and is caused to reciprocate by means of a roller 43 carried by the piston and bearing against the lower face of the cam track. The stem 13 of the valve 9 is influenced by a spring 14 which tends to hold the valve 9 closed and carries a follower roll 15, which is urged by the spring against a second cam track 16 on the disc 12.

The cam track 11 is so formed that during the rotation around the axis 2 each stoppering head descends into operative relation with the relative bottle likewise rotatable around the axis 2, before the bottle has reached the position where the stoppering pressure is applied, that is the right hand position shown in Fig. 1. As the valve 9 is held open until the stoppering head bears on the bottle neck, liquid flows freely from the cylinder 3 through the port 8 to the interior of the piston. The cam track 16 is so formed that shortly before the bottle reaches the right hand position shown in Fig. 1 the valve 9 is free to be closed under the action of the spring 14.

While differences in level of the bottles are

thus fully compensated for, nevertheless, during the stoppering operation proper, in consequence of irregularities in the formation of the beads on the bottle necks, there is a risk of dangerous pressure being applied. To eliminate this risk there is provided a safety valve 17 serving to close the central port 7, said valve opening inwardly, that is into the interior of the piston 6, and the spindle 18 of said valve being surrounded by a spring 19 which normally holds the conical valve 17 in closed position. The spring 19 is of such dimensions that only in the event of the pressure becoming excessive during the stoppering operation is the valve 17 automatically opened.

For manual adjustment there is provided a by-pass 20 adapted to be controlled by a set screw 21 functioning as a needle valve and serving when in open position to establish communication between the liquid space in the cylinder 3 and the interior of the piston 6.

The construction shown in Fig. 2 differs from that shown in Fig. 1 in respect that the controlled overflow valve and the self-closing overflow valve are coaxial, the second valve being fitted within the hollow spindle of the first valve. It is thus rendered possible to increase the diameter of the controlled valve member to approximately the diameter of the displacer piston so as to obtain increased certainty in operation and permit convenient adjustment of the spring pressure acting on the self-closing valve. Also, the controlled valve member is operatively related to a push-rod moved by a cam in a manner which permits convenient assembly and dismantlement of the parts.

Unlike the construction shown in Fig. 1 the displacer piston 6 of the construction shown in Fig. 2 has at its lower end a valve seat 30 coaxial with the piston, the diameter of which seat approximates to the piston diameter. This valve seat is engaged by a valve disc 31 forming the overflow valve proper. The stem 32 of the valve disc 31 has a central bore 33 adapted to be closed by a conical valve 34 having peripheral grooves 35. The conical valve member 34 is subject to the pressure of the spring 36 which at the end remote from the valve member bears on the end of a sleeve 37 adjustably screwed into the stem 32 and serving as a guide for the stem 38 of the valve 34. Should the valve 34 be lifted in opposition to the spring 36 on occasion of excess pressure, the grooves 35 establish communication between the bore 33 and cross passages 39 in the tubular valve stem 32 and thus establish communication between the two sides of the

piston. The valve disc 31 is held in closed position by a spring 40 and the stem 32 carries at its upper end a disc 41 engageable by the cam-influenced push-rod 13. Preferably, also a light helical spring 42 acts on the under side of the piston 6, the spring 42 urging the roll 43 against a cam track 11 to compensate for wear of the upper track on which the roll 10 bears. The operation of the construction shown in Fig. 2 is otherwise the same as that of the construction shown in Fig. 1.

I claim:—

1. A bottle stoppering machine comprising a reciprocating head, said head including a telescoping piston and cylinder with a chamber in-between for confining a body of liquid, means for reciprocating said head and transmitting capping pressure from one of said members through said body of liquid to the other of said members and thence to the bottle to be stoppered, a valve for permitting displacement of part of said liquid in response to initial reaction of said bottle against the adjacent member, to compensate for variations in the heights of the bottles, and means for closing said valve at a constant point in each similar phase of operation of the device, and a spring closed relief valve for permitting displacement of the liquid after the capping pressure has been applied, only upon the reaction of pressure from said bottle in excess of the normal capping pressure.

2. A bottle stoppering machine comprising a reciprocating head, said head including a telescoping piston and cylinder with a chamber in-between for confining a body of liquid, means for reciprocating said head and transmitting capping pressure from one of said members through said body of liquid to the other of said members and thence to the bottle to be stoppered, a valve for permitting displacement of part of said liquid in response to initial reaction of said bottle against the adjacent member, to compensate for variations in the heights of the bottles, and means for closing said valve at a constant point in each similar phase of operation of the device, and a spring closed relief valve for permitting displacement of the liquid after the capping pressure has been applied, only upon the reaction of pressure from said bottle in excess of the normal capping pressure the two said valves being coaxial, the first mentioned valve having a hollow stem within which the second mentioned valve is disposed.

In testimony whereof I have signed my name to specification.

WILHELM OTTO PAUL RIECK.