3 Sheets—Sheet 1.

A. MACDONELL.

Machinery for Filling and Corking Bottles, &c.

No. 211,413 **Patented Jan. 14, 1879.**

Fig. 1.

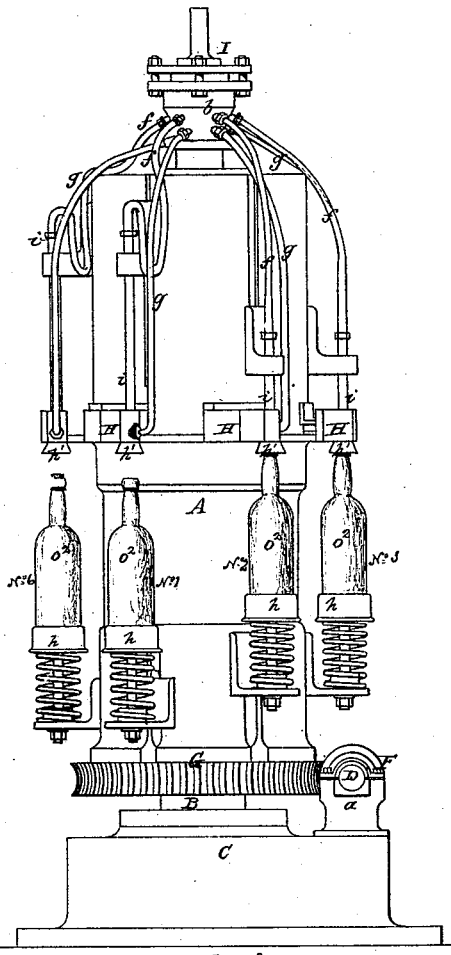


Fig. 2.

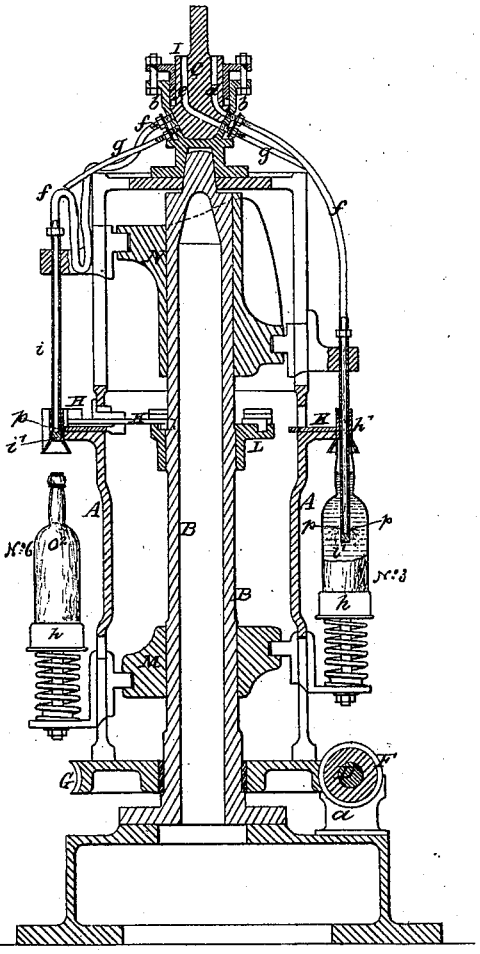


Fig. 3.

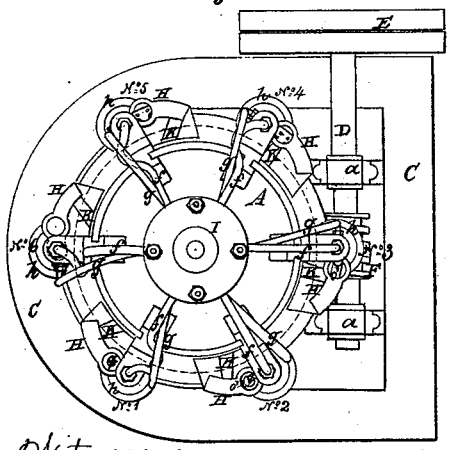
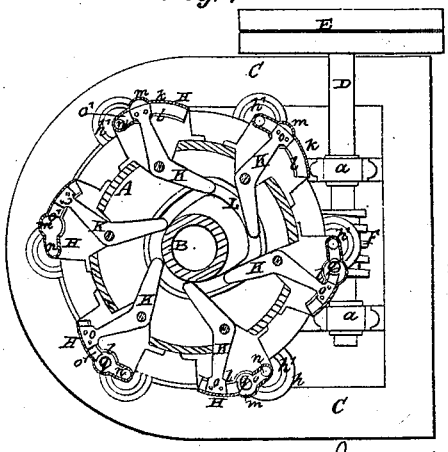


Fig. 4.



Witnesses
Henry Howson Jr.
Harry Smith

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Allan Macdonell
by his Attorneys
Howson and Sons

A. MACDONELL.

Machinery for Filling and Corking Bottles, &c.

No. 211,413. Patented Jan. 14, 1879.

Fig. 4a

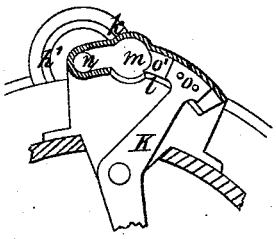


Fig. 5.

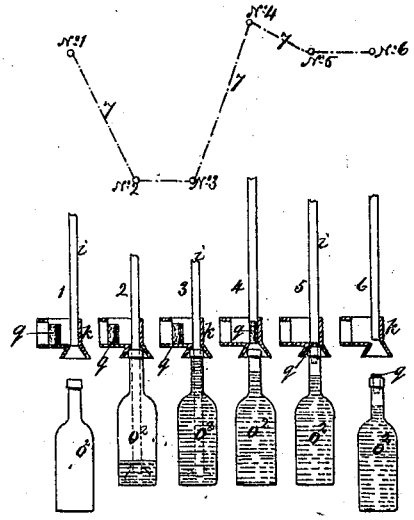


Fig. 6.

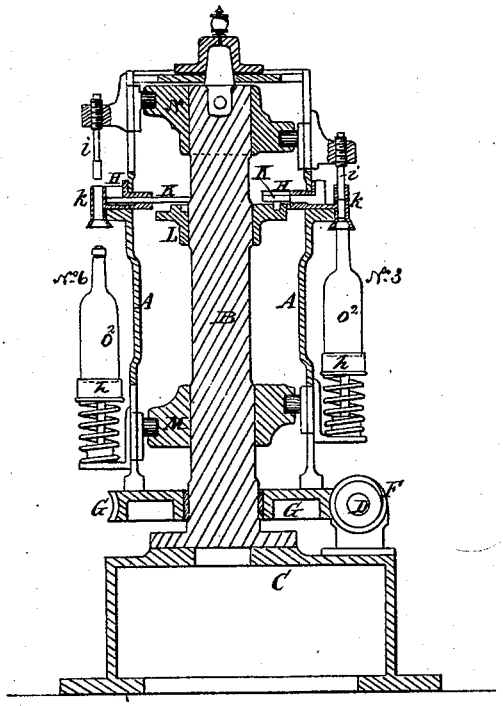


Fig. 8

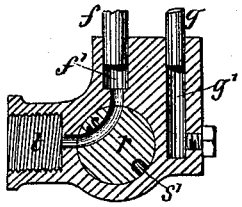
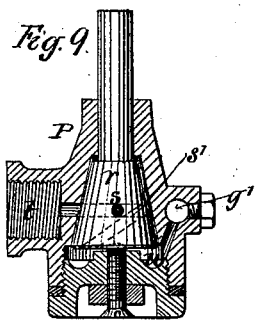


Fig. 9.



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3 Sheets—Sheet 3.

A. MACDONELL.

Machinery for Filling and Corking Bottles, &c.

No. 211,413. Patented Jan. 14, 1879.

Fig. 10

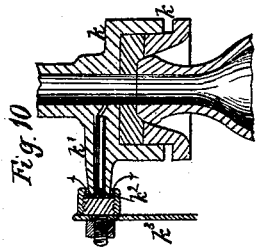


Fig. 11

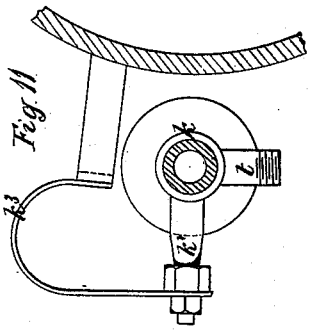


Fig. 11a

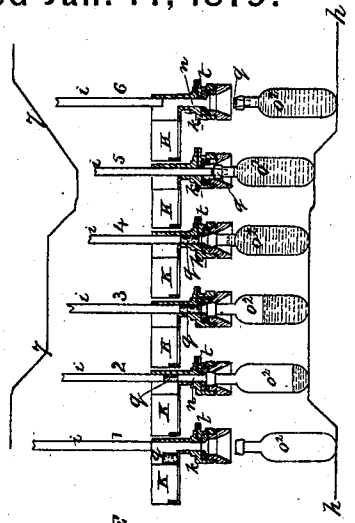


Fig. 12.

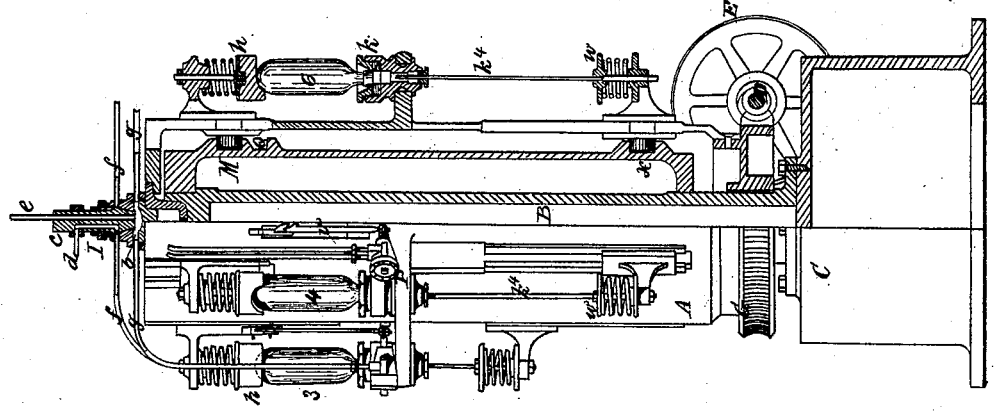
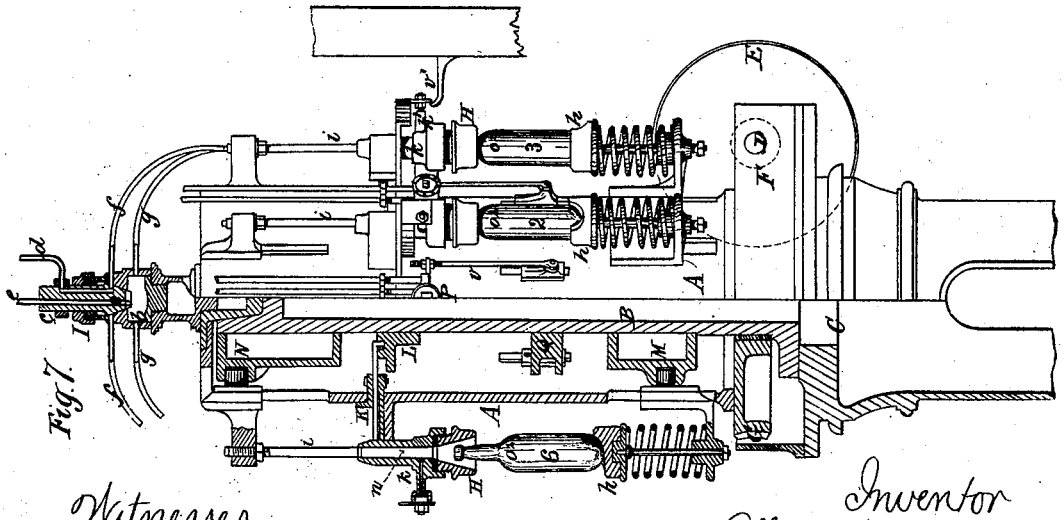


Fig. 7.



Witnesses
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Harry Smith

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UNITED STATES PATENT OFFICE.

ALLAN MACDONELL, OF NEWRY, IRELAND.

IMPROVEMENT IN MACHINERY FOR FILLING AND CORKING BOTTLES, &c.

Specification forming part of Letters Patent No. **211,413**, dated January 14, 1879; application filed August 13, 1878; patented in England, July 16, 1875.

To all whom it may concern:

Be it known that I, ALLAN MACDONELL, of Newry, Ireland, civil engineer, have invented Improvements in Machinery or Apparatus for Filling and Corking or Stoppering Bottles and other like receptacles, of which the following is a specification:

My invention relates to the filling and corking or stoppering of bottles and other like receptacles by automatic means; and it consists of an improved arrangement and combination of apparatus, whereby those operations are performed in a ready, rapid, and efficient manner, part of these improvements forming the subject of an English patent granted to me, No. 2,551, July 16, 1875.

In carrying out my said invention I employ a cylinder or frame, suspended or otherwise mounted, so as to be free to revolve on a stationary column or shaft, and carrying apparatus for filling bottles, (for example,) as hereinafter described; and also a series of corking or stoppering apparatus, which are arranged at convenient intervals all round, so that, on the cylinder or frame being caused to revolve, by transmitting motion thereto from a prime mover through the intervention of a worm and worm-wheel, or otherwise, a number of bottles may be subjected to the action of the apparatus in various stages of the operation simultaneously, the bottles being placed in position for filling and corking or stoppering and removed, after having been filled and corked or stoppered, without stopping the machine, which thus operates in a continuous manner; and in order that my said invention may be fully understood, I shall now proceed more particularly to describe the same, and for that purpose shall refer to the several figures on the annexed sheets of drawings, the same letters of reference indicating corresponding parts in all the figures.

Figure 1 of the accompanying drawings represents a side elevation of a combined machine for filling and corking bottles constructed in accordance with my said invention. Fig. 2 is a sectional elevation of the same; and Figs. 3 and 4 are a plan and sectional plan, corresponding, respectively, to Figs. 1 and 2. Fig. 4ª is a detail of a portion of the apparatus. Fig. 5 is a diagram, illustrating the different stages of the operation. Fig. 6 represents a sectional elevation of a machine for corking bottles constructed in accordance with my said invention.

The apparatus illustrated in Figs. 1 to 6 are adapted for non-aerated liquids.

Fig. 7 represents a part elevation and part vertical section of a combined machine constructed in accordance with my said invention for filling bottles with aerated liquids and corking the said bottles; and Figs. 8, 9, 10, and 11 are details, hereinafter referred to, of a portion of the apparatus. Fig. 11ª is a diagram, illustrating the different stages of the operation. Fig. 12 represents a part elevation and part vertical section of a combined machine constructed in accordance with my said invention for filling bottles with aerated liquids, and stoppering the said bottles when internal stoppers are employed.

The several apparatus illustrated in the drawings, and hereinafter described, are identical in the principle of their construction and differ only in their details, according as they are intended to be used for bottling non-aerated or aerated liquids in bottles closed with either ordinary corks or internal stoppers.

In the case of non-aerated liquids introduced into bottles to be stoppered with ordinary corks, the arrangement shown in Figs. 1 to 5 is adopted. In these figures, A is a cylinder or frame, which is suspended so as to be free to revolve upon a stationary column or shaft, B, supported upon a suitable base or foundation, C, the latter also carrying bearings *a a* for a shaft, D, to which motion is imparted by pulleys E and a belt from any suitable prime mover, and whence the motion is transmitted to the cylinder or frame A by a worm, F, fast on the shaft D, and a worm-wheel, G, with which it engages, mounted loose on the vertical shaft B and secured to the cylinder or frame A. This cylinder or frame carries apparatus for filling bottles, hereinafter particularly described in detail, and also a series of corking apparatus, H, which are arranged at convenient intervals all round, six apparatus being employed in the example illustrated in my drawings.

The filling apparatus consists of a conical valve or cock, I, the casing *b* of which is bolted

to the top of the cylinder or frame A, so as to revolve therewith, while its internal plug or key *c* is maintained stationary. This plug or key is provided on its face with two ports and passages, *d e*, one, *d*, in communication with a reservoir containing the liquid to be introduced into the bottles, and the other, *e*, in communication with a pump for drawing off the surplus overflow from the bottles, as hereinafter explained.

From the casing of the valve or cock leads two series of pipes, *f g*, the total number of each of which is equal to that of the corking apparatus employed, a pipe, *f*, and a pipe, *g*, being provided for each corking apparatus H. These pipes are so arranged that as the cylinder A revolves the pipe *f* of each apparatus is placed in communication with the port *d* of the plug or key *c* leading from the liquid-reservoir, and the plug *g* of each apparatus is placed in communication with the port *e* in the said plug or key leading to the pump before mentioned, so that each bottle is filled in its turn, and the surplus liquid supplied to the bottles is successively drawn off by the pump.

Each of the corking apparatus H consists of a device for compressing the corks, (shown in detail in Fig. 4ª, and hereinafter particularly described,) a spring-stand, *h*, for the bottles, and a piston, *i*, for forcing the corks into the bottles.

The compressor consists of a holder, *k*, slotted at *l*, and having an enlarged opening, into which the corks, one by one, are inserted, and also having a contracted portion, *n*, into which each cork is forced, so as to reduce its size, by a compressing-slide, *o*, having a reciprocating rotary motion, the portion o^1 of the slide which acts upon the cork being made of a segmental concave shape, so that when it has completed its stroke in compressing the cork it forms, with the extremity of the contracted portion of the holder, a complete tube, *h'*, in which the cork under operation is tightly held. The reciprocating motion of the compressing-slides *o* is obtained by means of bell-crank or angular levers K, operated by a cam, L, fast on the stationary column or shaft B.

The spring-stands *h* for the bottles, which are operated by another cam, M, on the stationary column or shaft B, are each forced up, as required, in order to bring the mouth of the bottle which it carries, and which has been filled in the manner hereinbefore explained, beneath the compressing-tube *h'*, and the cork, compressed in the manner hereinbefore described, is forced by one of the pistons *i*, operated by another cam, N, on the stationary column or shaft B, into the mouth of the bottle.

I utilize as the pistons a continuation of the pipes *f*, employed for filling the bottles. Each piston is composed of a tube, *i*, of brass or other suitable rigid material, the lower end, *i*, of which—*videlicet*, that end which presses upon the corks—is solid, two lateral openings, *p*, being provided for the discharge of the liquid into the bottle. The tubular piston *i* is first employed for filling the bottle, and then for forcing the cork into the mouth thereof, assuming that six corking apparatus are employed, arranged round the cylinder or frame, as in the example illustrated. Each bottle subjected to the action of the machine is passed through six successive stages in the operations of filling and corking, corresponding to six equidistant points in the circumference of the stationary column or shaft, which each corking apparatus passes in turn during one revolution of the cylinder or frame.

These several stages of the operation will be understood by reference to the diagram, Fig. 5, with the aid of Figs. 1 to 4, the six equidistant positions being denoted, respectively, by the numbers 1, 2, 3, 4, 5, and 6. In position No. 1, a bottle, O^2, is placed upon its stand *h*, and a cork, *q*, is inserted; the tubular piston is being elevated, although not in its highest position, by the time position No. 2 is reached; the stand *h* has been raised; the tubular piston *i* has been inserted in the bottle, and the filling has commenced, the same continuing (by reason of the cock I being formed with segmento-annular grooves or channels) until the bottle has arrived at position No. 3, by which time the filling is completed. In position No. 4, the tubular piston *i* has been raised to its highest point; the cork *q*, in a state of compression, is situate over the mouth of the bottle, and the surplus liquid has been withdrawn. By the time position No. 5 is reached the tubular piston *i* has been depressed, and the cork *q* forced into the mouth of the bottle, after which the stand *h*, carrying the filled and corked bottle, is lowered for the removal of the latter on its arrival at position No. 6. Another bottle and cork are then supplied in position No. 1, and the preceding operations are repeated, and so on in succession.

The dotted line 7 in the diagram, Fig. 5, illustrates the approximate shape of the groove in the cam N for operating the pistons *i* as it would appear developed on a plane surface.

It will be understood that the other five corking apparatus are simultaneously in action at the different gradatory stages in the operations hereinbefore described, the attendant being constantly employed, as the different apparatus successively pass the point at which he is stationed, in removing the bottles which have been filled and corked, and replacing them by empty bottles to be filled and corks to be inserted.

When it is not required that the bottles should be filled automatically, the peculiar filling apparatus may be dispensed with, the corking apparatus constructed, arranged, and operating substantially in the manner hereinbefore described being alone employed.

An example of this modification is illustrated in Fig. 6 of my drawings, the corking apparatus being constructed generally in a similar manner to that of the apparatus shown in Figs. 1 to 4, with the exception that the pistons *i*

are now made solid in lieu of tubular, which arrangement of pistons may also be adopted in the apparatus shown in Figs. 1 to 4, special filling-tubes being in that case employed.

The operation of the corking apparatus is analogous in both cases. The action of the modification shown in Fig. 6 will therefore be understood from the description hereinbefore given without further explanation.

In the case of aerated liquids to be contained in bottles stoppered with ordinary corks, the modification of apparatus illustrated in Figs. 7, 8, 9, 10, 11, and 11ª is adopted, which apparatus is identical in principle with the apparatus shown in Figs. 1 to 4ª, and only differs therefrom in the following respects, the variations being necessitated by the different requirements of aerated and non-aerated liquids.

A conical valve or cock, I, is employed, as in the arrangement shown in Figs. 1 to 4ª; but the passage *d* in the stationary plug *c* is intended for the introduction of the sirup, and the passage *e*, which is permanently open, is intended for the introduction of the aerated liquid.

The passages *d e* communicate successively with the series of pipes *f g*, leading to the several bottles, as in the arrangement previously described; but in the present case each set of pipes *f g* terminates at the lower end in a three-way cock, P, one of which is shown detached in vertical and horizontal section in Figs. 8 and 9, respectively, and which cocks regulate the inlet of the sirup and aerated water into the bottles.

The plug R of each three-way cock is formed with two passages, S S′, the former of which is capable of being brought into communication at *f′* with the pipe *f* for the introduction of the sirup, and with the outlet *t*, which leads to the holder *k*, as shown clearly in Fig. 8, while the passage S′ is permanently open to a chamber, *u*, at the larger end of the cone *r*, and maintained constantly supplied with aerated water through the passage *g′*, leading from the pipe *g*. The pressure of the aerated water thus maintains the cock gas-tight. The water is conducted into the bottle through the outlet *b* when the plug *r* is turned, so as to bring the passage S′ into communication therewith.

The cocks P are actuated through the intervention of a system of rods and levers, *v*, from a cam, Q, fast on the stationary column or shaft B.

The corking apparatus are similar in construction to those employed in the arrangement of machine hereinbefore described with reference to Figs 1 to 4ª, with the exception that the pistons *i* are solid, as in the modification shown in Fig. 6, in lieu of tubular, and the operation is analogous to that of the said former arrangement.

The holder *k*, through which the liquid is introduced and the cork is inserted in the bottle, is, however, in this case provided with a branch, k^1, (see detail vertical section and sectional plan, Figs. 10 and 11,) the orifice of which is normally closed by a valve, k^2, designated a "snifting-valve," maintained in contact with its seat by a spring, k^3. In proportion, however, as the liquid is introduced into the bottle the air escapes, forcing back the valve k^2; and when the bottle is filled, and it is required to insert the cork therein, additional relief is provided by the employment of a fixed claw or tappet, *v′*, Fig. 7, which forces back the spring k^3 and admits of the escape of the air and of a certain quantity of carbonic acid.

The contracted portion *n* of the holder *k* is continued downward in the form of a tube for a sufficient depth, so that when the cork is compressed and forced its own length down the tube an air-tight space shall be left between the cork and the mouth of the bottle to admit of the free flow of the liquid into the bottle, while preventing any escape of gas except by the snifting-valve.

The operation of the apparatus will be clearly understood from the following explanation, reference being had to the diagram, Fig. 11ª.

In position No. 1, a bottle, O^2, is placed upon its stand *h* and a cork, *q*, is inserted, the solid piston *i* being elevated. By the time piston No. 2 is reached the stand *h* has been raised, and the cork *q* has been compressed and brought over the tube *n*, leading to the mouth of the bottle, and the cock P has been turned a partial turn in one direction and the introduction of the sirup has commenced. Between positions Nos. 2 and 3 the cork *q* is forced down about the extent of its own length into the tube *n*; the cock P is turned in the reverse direction to that of its previous motion and through a longer arc, thus cutting off the supply of sirup and introducing the aerated water, the supply of which continues until after position No. 4 is passed, the snifting-valve k^2 being opened at the requisite period by the claw or tappet *v′*, thus admitting of the escape of any remaining air and excess of carbonic acid, in readiness for the reception of the cork *q*, which, by the time position No. 5 is reached, is, by the descent of the piston *i*, forced into the mouth of the bottle. The stand *h*, carrying the filled and corked bottle, is then lowered for the removal of the latter on its arrival at position No. 6, to be replaced at position No. 1 by another bottle and cork, when the preceding operations are repeated, and so on in succession.

The modification of apparatus illustrated in Fig. 12, which is intended to be used for bottles to be closed with internal stoppers, is constructed upon the same principle. In this case the snifting-valve k^2 is dispensed with, and its place is supplied by a series of open air-tubes, k^4, carried by spring-brackets *w*, which are raised at intervals by a cam, *x*, fast on the stationary column or shaft B, in order to cause the tubes to rise in the interior of the bottles, which are arranged in an inverted position, with the neck supported by the funnels

k, and the bottom maintained in position by the inverted spring-stands h. The air is thus enabled to escape through the tubes k^4 as the bottles are filled, and on the operation of filling being completed the bracket w, carrying the tube k^4 of the filled bottle, is allowed by the cam x to descend suddenly by gravitation clear of the mouth of the bottle, when the internal stopper immediately falls into the mouth of the bottle, where it is retained by the pressure of the fixed air contained in the aerated liquid.

The cock I and the cocks P may be of substantially similar construction to the corresponding cocks employed in the arrangement shown in Fig. 7.

In the present modification the following series of operations is performed.

A bottle, O^2, is placed over the funnel k in position No. 1, and is securely retained by the descent under the action of its cam M of the stand h by the time position No. 2 is reached. At this point, also, by the ascent of the bracket w, the tube k^4 begins to rise into the bottle, and the supply of the sirup commences to be followed by the supply of the aerated liquid, as before. By the time position No. 5 is arrived at the bottle will have been filled and the tube k^4 withdrawn, and the bottle closed by the descent of the internal stopper into its mouth consequent upon the withdrawal of the tube. The stand h next rises, ready for the removal of the bottle at position No. 6; and on position No. 1 being again arrived at another bottle is introduced, when the preceding series of operations is repeated, as before, and so on in succession during the operation of the machine.

If desired, my improved apparatus may be so arranged that two sets of bottles may be subjected to the action of the machine, and be passing through the several gradatory stages of the operation simultaneously, two attendants being employed if necessary, stationed at opposite side, of the machine.

It is obvious that the spaces between the successive positions—that is to say, between the bottles placed around the machine—are not necessarily equidistant, as the apparatus may be otherwise arranged, if found desirable.

By the term "bottle," as used in this my specification, is to be understood any receptacle capable of being closed with a cork or stopper.

I claim as my invention—

1. The combination of a rotating frame with bottle-holders and bottle filling and corking devices, and mechanism for automatically operating the same, all substantially as set forth.

2. The combination, in a bottle-corking machine, of a piston with devices, substantially as herein described, whereby the corks are seized, compressed, and brought into position for application to the neck of the bottle, as specified.

3. In a machine for filling and corking bottles, the combination of devices for holding the cork with a tubular piston for supplying the liquid, and adapted, also, to force the cork into the bottle, substantially as described.

4. The combination of the bottle-holder and piston with the cork receptacle and compressor o, substantially as set forth.

5. The combination of the pipes f g and tube i with the holder H.

In witness whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ALLAN MACDONELL.

Witnesses:

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