No. 887,838. PATENTED MAY 19, 1908.

W. PAINTER.

MACHINE FOR MAKING CLOSURES FOR BOTTLES AND THE LIKE.

APPLICATION FILED MAY 24, 1905. RENEWED OCT. 3, 1907.

2 SHEETS—SHEET 1.

Fig. 1.

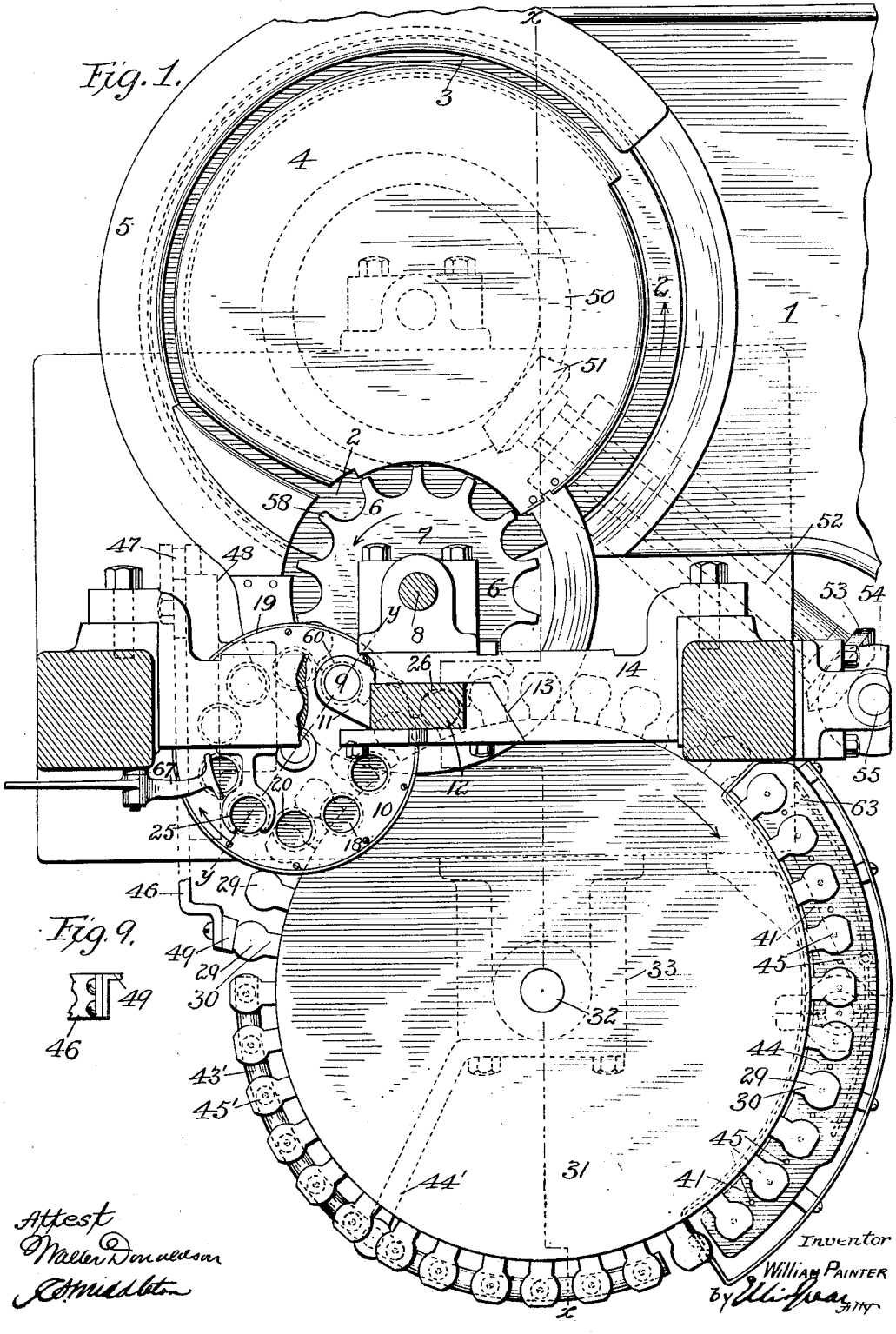


Fig. 9.

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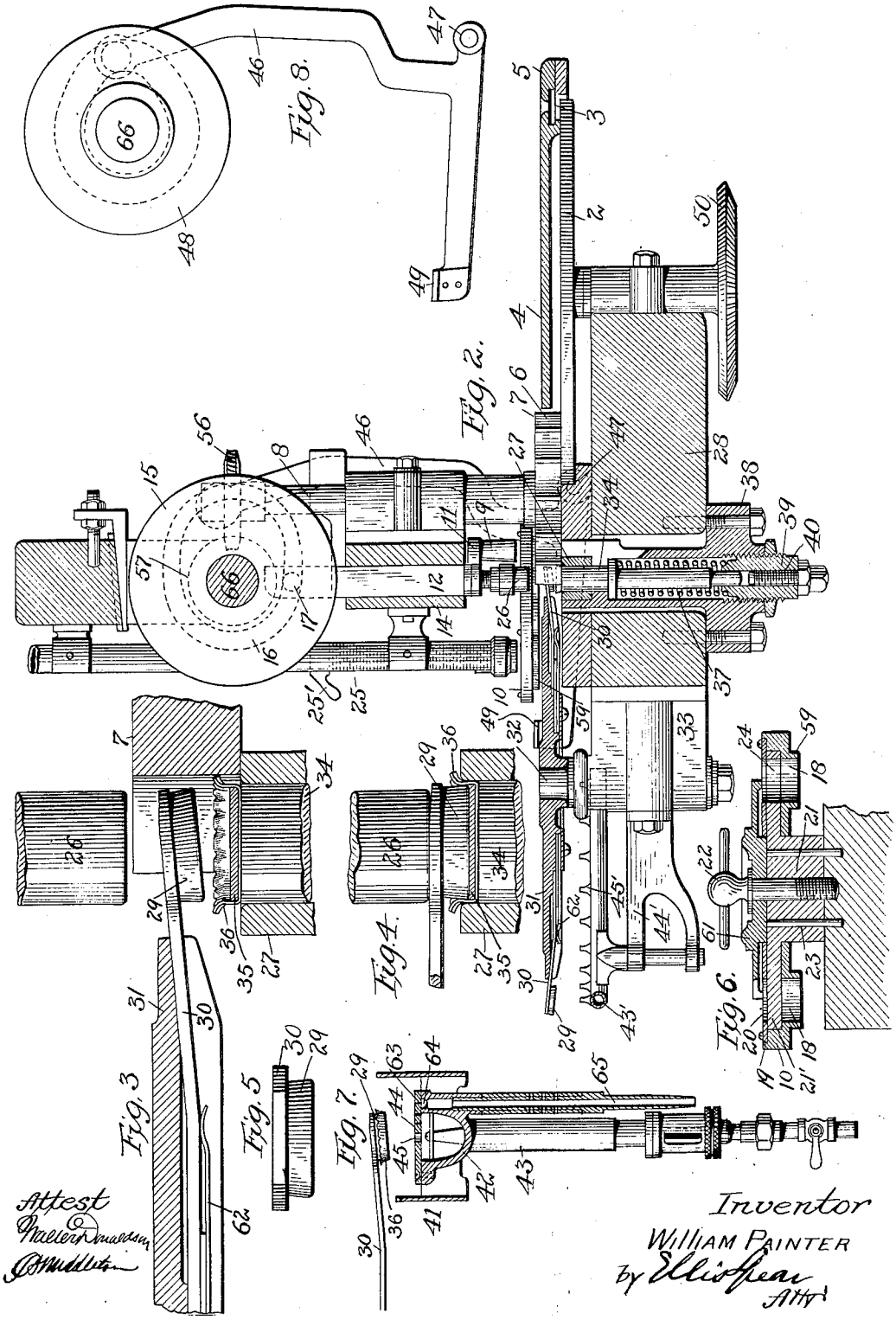
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2 SHEETS—SHEET 2.



UNITED STATES PATENT OFFICE.

WILLIAM PAINTER, OF BALTIMORE, MARYLAND, ASSIGNOR TO CROWN CORK AND SEAL COMPANY OF BALTIMORE CITY, OF BALTIMORE, MARYLAND.

MACHINE FOR MAKING CLOSURES FOR BOTTLES AND THE LIKE.

No. 887,838. Specification of Letters Patent. Patented May 19, 1908.

Application filed May 24, 1905, Serial No. 262,049. Renewed October 3, 1907. Serial No. 395,758.

To all whom it may concern:

Be it known that I, WILLIAM PAINTER, a citizen of the United States, residing at Baltimore, Maryland, have invented certain new and useful Improvements in Machines for Making Closures for Bottles and the Like, of which the following is a specification.

In certain applications for patent filed by me June 6, 1902, (Serial No. 110,535) and September 29, 1902, (Serial No. 125,180) I disclosed certain novel methods or processes of manufacturing bottle closures, wherein a special feature involves the interposition of a suitable fusible protecting amd binding medium between a suitable metallic cap and a suitable sealing gasket or packing; then properly heating the cap, gasket and said medium, and meantime subjecting the whole to appropriate pressure, and while still under such pressure, cooling the completed closure.

My present application discloses certain novel mechanism, both in detail and in organization, as devised by me for the manufacture of bottle closures in harmony with my said novel method, and with special view to economically producing closures involving sundry novel characteristics of substantial value. A reliably firm union of the metal with the packing is assured, which contributes to substantial economy, because the packing, whether in the form of rings or disks, can be not only thinner, but of less diameter than heretofore, and such open pits or holes as are common to cork are well closed next to the metal, and the cork itself, although quite well condensed has highly effective resiliency. Liquid can seldom if ever reach back of the packing when the closure is in use on a bottle, and the central portion of a disk packing is so firmly held as to prevent undue inward bulging.

After a detailed description of my present invention in connection with the accompanying two sheets of drawings, the several features deemed novel will be duly specified in the several clauses of claim hereunto annexed, it being understood that the machine here illustrated is adapted to operate in connection with closures of the well known "Crown cork system."

Referring to the drawings, Figure 1 illustrates, mainly in plan view but partially in section an organization embodying my present invention. Fig. 2 is a vertical section of the parts shown in Fig. 1 on the irregular line x—x (but on a somewhat reduced scale) and also certain overlying parts, some in side or edge view, and others in section. Figs. 3 and 4, on an enlarged scale, and in two successive positions, illustrate an appropriate pressure block with a plunger and a die, which coöperate in effecting a temporary mechanical union of each presser block with a cap and its packing, and also the desired compression of the contents of the cap. Fig. 5 is a side view of a presser block and the end of the arm on which it is carried. Fig. 6, in section on line y—y Fig. 1, illustrates a cork carrier and its hub or journal, an underlying portion of the frame of the machine, and an overlying plate or cover, not shown in Figs. 1 or 2. Fig. 7 illustrates in elevation and vertical cross section a heating apparatus, and also in side view an overlying presser block holding a filled closure in proper position to be heated. Fig. 8 illustrates in side view, a cam wheel and a bell crank lever carrying a clearer for detaching finished closures from the presser blocks. Fig. 9 is a detail view of the clearer for releasing caps from the presser blocks.

Believing it will be conducive to a prompt comprehension, to first indicate in a general way the salient parts of the machine and its mode of operation, I will state, specially referring to Fig. 1, that a fixed table 1 receives metal caps already provided with a suitable interior binding medium; an attendant arranges them open side up and slides them upon an exposed portion of a continuously revolving feed table 2, partially covered, as at 4 and 5, so as to afford near the periphery of the table a curved race-way or channel 3. The caps are frictionally carried through this channel until they reach its end at a circular space occupied by an intermittently operated star wheel 7, overlying a portion of the feed wheel, and having between its arms, semi-circular spaces or pockets 6 adapted to receive the caps one by one from the channel 3 and carry them in a circular path beneath an intermittently operated cork wheel or carrier 10. This carrier receives the packing from above regardless of its form, (*i. e.*, sometimes ring shaped, but generally in disk form,) at 25 and delivers the packing at 9, where a cork plunger forces it downward into an underlying cap still within the custody of the star wheel 7, which then carries the filled caps one by one in a circular path beneath a

vertical presser block plunger 26 to, over, or into, a coöperating stationary die. An intermittingly operated circular table, here termed a "timing" table, carries at its periphery a series of equidistant circular presser blocks 29 on the under sides of spring controlled radial arms 30, so that when a cap with its packing stops at the die and plunger 26, the latter will force the presser block into the cap, upon the packing, and carry the cap into the die until appropriate pressure has been assured. The die being of slightly less diameter than the caps, the flange of each is peripherally reduced and made to tightly engage with a presser block, and when released from the die, it is carried by the presser block with the binding medium and packing more or less heavily compressed, because of the firm (but temporary) mechanical union of the cap and presser block. The timing table by its intermittent movement first presents each presser block and the closure thereon to a heating apparatus at 41, for fusing the binding medium, and from thence, to the cooling apparatus at 43′, and after having been properly cooled and the binding medium hardened, the finished closures or "crowns" are automatically released from the presser blocks by a clearer at 49.

Now as to a more specific description, it will be seen in Figs. 1 and 2 that the feed table 1 is continuously rotated by way of a vertical shaft 55, bevel gears 54 and 53, a horizontal shaft 52, bevel gear 51, and an overlying horizontal bevel gear 50 on a spindle pendent from the table and carried in a hanger at a portion 47 of the frame. The central cover 4 of the table, and the curved cover plate 5 with the intervening channel 3 have already been referred to. For working upon plain "crowns" the surface of the table may be of metal, hard paper, or wood, but for decorated crowns it will sometimes be desirable to have a softer covering, such as leather, to avoid scratching the decorations.

The star wheel 7 has multiple functions, and hence it is difficult to specially designate it in harmony with its duties. It not only takes unfilled caps one by one from the feed table and carries them to the cork feeder 10, but it also operates with its teeth 58 as a sprocket or gear in driving said feeder, step by step, and still further in like manner with its pockets 6 delivers filled caps to the die, and drives the timing table. The star wheel shaft 8 is intermittently driven by its worm gear 56, actuated from the adjacent continuously driven shaft 66, by means of a cam 57 having a spline or worm which operatively engages with the worm gear long enough to impart required movement to the star wheel, said spline being so shaped, (*i. e.*, straight and curved,) as to afford the required rest during the remainder of its own rotation in a manner well known. These parts are similar to those described in Letters Patent of the United States granted to Wm. H. Wheeler 798549 August 29, 1905.

The cork wheel, or feeder 10, shown in section in Fig. 6, is horizontally journaled on top of a circular bearing plate 21′, having a hub or post 21 mounted upon and doweled, as at 23, to a portion of the frame of the machine and held down by a clamp screw 22 which also controls a cover 61 which is not indicated in Figs. 1 and 2, and may or may not be used. The cork wheel is composed of a heavy bottom plate 19 provided with a rabbeted flange, and an attached thin top plate which rests upon the bearing plate 21′. This top plate is provided with an annular series of circular holes 20, which register with corresponding holes 18 in the bottom plate 19 whenever in the course of rotation they register with a similar single hole 24 in the bearing plate 21, at which point the cork plunger 9 performs its duty. Except at this one point, the bearing plate serves as the bottom for all the holes 20, and enables them to serve as pockets for packing disks delivered thereto from the overlying cork tube 25, Fig. 2. This cork tube is vertically slitted at one side and is provided with a weight 25′ having a projected finger piece for enabling it to be lifted from the tube when a fresh supply of cork is needed, said weight assuring a proper delivery of corks from the bottom of the pile in the tube, one by one, into each pocket 20 as it passes below.

Adjacent to the tube 25 there is a hinged finger 67 connected with an electric signal (not shown) for announcing any failure of delivery of cork to a pocket, but this constitutes no part of my present invention. At each hole in the bottom plate, there is a pendent boss or flange 59, serving as a gear tooth for engagement by the star wheel as indicated at 60, Fig. 1.

The conveyer or timing table 31 is rotated step by step on its pintle 32 on a hanger 33 and is provided with a series of radial arms 30, strongly hinged, projecting from its periphery, and each normally maintained in an elevated inclined position by a spring 62. Each of said arms carries below its outer end a pendent presser block 29, frusto-conical in form, larger at its face than at the arm, and of appropriate size to properly enter a filled cap and bear upon the cork disk or packing and to be itself firmly engaged by the flange of the cap after the packing has been compressed, thus enabling the presser block to maintain desired pressure on the packing until the finished closure is finally released therefrom. As already indicated the presser block arms 30 also serve as teeth engaged by the star wheel in actuating the timing table.

The cork plunger 9 is mounted on a lateral arm 11 projecting from beneath a slide 12 (in guide bearing 13 on cross bar 14), which

also carries the presser block plunger 26, all simultaneously vertically reciprocated by means of a stud 17 in a cam groove 16 in a cam wheel 15 on the shaft 66, said groove being so shaped as to cause the plungers to operate when the cork wheel, the star wheel and the timing table are at rest.

The presser block plunger 26 coöperates with the underlying die 27 (on bed plate 28) containing a die block 34 which serves as a slidable bottom for the die, and has a pendent spindle 37 within a spiral spring having its thrust bearing at the top against a collar, and at the bottom on a tubular screw-threaded support or plug 39 (in a hanger 38,) which contains the lower end of the spindle and also an underlying stop screw 40.

It will now be obvious that the organization of the presser block plunger, the presser blocks with their arms, and the die, is such, that when a filled cap has been delivered to the die, as shown in Fig. 3 beneath a presser block, the plunger will descend, force the block into the cap, and drive it into the die and firmly lock the cap 36 to the block with the packing properly compressed, and that the extent of condensation can be predetermined by an adjustment of the stop screw upon which the block spindle abuts.

The spring in yielding, assures a gradual application of pressure, and in some cases it may be relied upon for limitation, but its prime function is to enable the die block to act as an ejector for promptly releasing a cap and presser block from the die, and it being adjustable its inevitable weakening can be compensated. The extent to which the cap may be forced into the die is also positively controlled by the stop screw 40, thus enabling variations as to the contraction of the flange of a cap and also as to the tenacity of its union with a presser block.

As to the heating apparatus 41, it is to be understood that it may be widely varied without departure from the main feature of my invention. The heat may be derived from electricity, steam, or combustion either within or flaming from the heater; but however heated the organization of the heater with the timing table should be such as to appropriately heat the caps on the loaded presser blocks during their progressive movement, and in each case appropriate to special conditions involved; as for instance, some packing and some form of binding medium, and some materials or compounds thereof, will require more heat than others, or less heat with varied extent of exposure, and plain crowns may be safely exposed to heating conditions which might be ruinous to decorated crowns.

As here shown, specially in Fig. 7, the heater 41 consists of a horizontal flat topped chamber 42 supplied with gas and air (on the Bunsen plan) by way of the vertical pipe 43 provided with a suitable sleeve for controlling the air mixture, and with a suitable cock for graduating the supply of gas or cutting it off. The flat burner top 44 has suitable jet apertures 45. A pilot burner (or ready lighter) 65 with its jets at 63 receives gaseous mixture from a small chamber 64 concentric with the main burner. For maintaining a proper control of the heat and the adjacent air currents induced thereby, the burner has adjacent vertical side walls which, while permitting more or less air to freely rise from below the burner, also guard against undue lateral disturbance as from drafts of air.

As to the cooling operation in the organization, it is to be understood that under some circumstances and with some materials requiring but little heat, it will only be necessary to provide for the transit of the heated closures beyond the heater for a long enough time to enable them to be cooled by the atmosphere at normal temperature before they are released from the presser blocks. For meeting all requirements however, an artificial cooling operation is important. The packing is quite heavily compressed, and air largely excluded from the cap, and hence with a heavy solid binding medium to be fused or softened, or one containing volatile matter, considerable heat would have been needed, and if such heat were not thereafter promptly checked or reduced, the packing or said medium or both, might be injured, and should the release of the closures from the presser blocks precede a proper hardening of the binding factor, and a proper cooling of the packing, the latter in expanding from a condensed condition might largely derange the union of metal and packing. As here shown, the cooler consists of a curved pipe 43′ on an arm 44′ and provided with vertical jet tubes 45′ in the path traversed by the crown laden presser blocks. Air, preferably under considerable pressure, is delivered to the cooler, so that on emerging in small jets it will promptly expand and induce a low temperature while directly impinging against the crowns when at rest, as well as during their movement.

In view of the falling tendency of cold air, it will be found sometimes advisable to provide an additional set of cooling jets located above or at one side of the path for delivering air inwardly or downwardly upon the crowns and blocks, which latter are liable to get unduly heated. To guard against such undue heating, the presser blocks may be provided with cores of wood, or other good non conductor of heat, the rims being of hard metal sufficiently smooth and strong to withstand the heavy grasp of the cap flanges, and admit of ready release.

The releasing of the caps from the presser blocks may be variously effected without de-

parture from my invention. The clearer 49, as indicated in Figs. 8 and 9, is intermittingly actuated from the horizontal shaft 66 by a cam wheel 48, and a bell crank lever 46 pivoted at 47, the lever at its upper end having a roller stud within an appropriate cam groove, (shown in dotted lines,) assuring the proper vertical reciprocation of the clearer, which overlies the edge of a crown on any presser block standing at rest at the point of clearance.

Having thus described my invention I claim,

1. In an organization for uniting the metallic member of a bottle or like closure with its compressible packing having a fusible material interposed between it and said metallic member, means for engaging the packing to press the same against the metallic member with the fusible material interposed, and means for subjecting said parts to a change in temperature, said change in temperature being maintained while the said packing is maintained under compression, substantially as described.

2. In an organization for uniting the metallic member of a bottle or like closure with its compressible packing with fusible material interposed, heating means and means for engaging the packing to hold it under compression while the closure is cooling, substantially as described.

3. In an organization for uniting the compressible packing with the metal caps of bottle closures, means for heating the metal caps with the contained packing and interposed fusible material, and means for subjecting the packing to compression, and during said compression subjecting the metal cap to a cooling action, substantially as described.

4. In an organization for making bottle closures of the cap variety, the combination, substantially as hereinbefore described, of means for automatically assembling the metal caps and packing, means for heating the caps, and means for subjecting the packing to pressure to hold it in proper position against the cap and the interposed fusible material while cooling, substantially as described.

5. In an organization for making bottle closures of the cap variety, the construction substantially as hereindescribed, consisting in means for automatically assembling the caps, the packing and the interposed material, means for heating the parts to fuse the binding material, and means for holding the packing under pressure within the cap while the parts are cooling and the binding material is hardening, substantially as described.

6. In combination, means for heating the assembled closure members and means for pressing the said members together and holding the said members under this pressure and while cooling, the said means of compression being movable to convey the closure while its members are maintained under pressure, substantially as described.

7. In an organization for making bottle closures of the cap variety, the combination substantially as hereinbefore described, of means for heating caps containing a compressible packing and an interposed binding medium, means for maintaining pressure thereon during the heating operation, said means entering the cap and engaging the compressible packing, and means for automatically controlling the caps during and after the heating operation.

8. In an organization of the character indicated, the combination substantially as hereinbefore described, of means for heating caps having compressible material therein, means for artificially cooling them, and means for maintaining the contents of the caps under compression during the heating and cooling operations.

9. In an organization for uniting the metallic member of a bottle or like closure with its packing, means for pressing the packing into said metallic member, and means for subjecting the said parts to heat while maintained under pressure, substantially as described.

10. In combination, means for pressing together the members of a bottle or like closure, means for first subjecting said members to heat while maintained under pressure and then to cooling influences while maintained under pressure, substantially as described.

11. In combination, means for pressing the members of a bottle or like closure together and for holding the said members under this pressure, means for heating the members while under said pressure, the said means for compression being movable to convey the closure while its members are maintained under pressure, substantially as described.

12. In combination, a heating apparatus, a conveyer having means for holding the members of a bottle closure together under pressure, said conveyer being arranged to carry the closure while its members are maintained under pressure to said heating apparatus and to carry the said members maintained under pressure away therefrom, substantially as described.

13. In combination, heating apparatus, a conveyer having means for holding the members of the closure together under pressure, said conveyer being arranged to carry the closure while its members are maintained under pressure to said heating apparatus and to carry the said members maintained under pressure away therefrom, and means for discharging the closure from the said conveyer, substantially as described.

14. In combination, a pressure plunger,

means for feeding the closures beneath the same to be pressed, and a movable pressure maintaining conveyer to carry the compressed closure from beneath the plunger while maintaining it under pressure, substantially as described.

15. In combination, a pressure plunger, means for feeding the closures beneath the same to be pressed, a conveying device movable beneath the plunger and a die for attaching the closures under pressure to said conveying device, substantially as described.

16. In combination, a pressure plunger, a conveying device provided with presser blocks arranged to move over the closure to be pressed and under the pressure plunger, and a die for crimping the flange of the closure to the presser blocks for attaching the same thereto and maintaining the members of the closure under pressure, substantially as described.

17. In combination, a pressure plunger, a conveying device movable beneath the same and over the closure to be pressed, said conveying device carrying the closure under pressure from beneath the pressure plunger, and a heating device to which the closure is conveyed while maintained under pressure, substantially as described.

18. In combination, a pressure plunger, a conveying device provided with frusto-conical presser blocks arranged to move beneath the pressure plunger and over the closures to be pressed and a die for crimping the flange of each closure on to a presser block, substantially as described.

19. In combination, a pressure plunger, a coöperating die having a spring controlled die block therein and a conveying device provided with a presser block, whereby said pressure block with a closure under pressure will be released from the die and carried away therefrom, substantially as described.

20. In combination, a pressure plunger, a star wheel having pockets or spaces between its arms for carrying crowns beneath the pressure plunger, a conveyer and presser blocks carried thereby to receive the crowns under pressure, the said conveyer being operated by the movements of the star wheel, substantially as described.

21. In combination, a pressure plunger, a star wheel, a conveyer having pressure maintaining means, arms on the conveyer for holding said pressure maintaining means, said arms meshing with the pockets of the star wheel, substantially as described.

22. In combination, a die on which the closures are placed, and pressure maintaining means on to which the closure is pressed by the action of the die, to be held under pressure, substantially as described.

23. In combination, a presser block for holding a crown closure with its packing disk under pressure, and means for placing the crown under pressure thereon.

24. In combination, a presser block for holding a crown with its packing disk under pressure, and means for placing the crown thereon under pressure, consisting of a plunger and a die, substantially as described.

25. In combination, a presser block for holding a crown with its packing disk under pressure, a die and a plunger, said plunger and presser block being movable towards and from the die, substantially as described.

26. In combination, a presser block having a peripheral surface adapted to enable a crown to be gripped thereon under pressure, and means for connecting the crown with the presser block.

27. In combination, a device for holding a crown with its packing disk under pressure, and means for placing the crown with its disk carried by said holding device and maintaining the contents of the crown under pressure while uniting them, substantially as described.

28. A machine for making closures for bottles and the like, comprising means for uniting the crowns with their disks and for holding them under pressure during that operation.

29. A machine for making closures for bottles and the like comprising means for uniting the crowns with their packing disks and for conveying and holding them under pressure during the uniting operation.

In testimony whereof, I affix my signature in presence of two witnesses.

WILLIAM PAINTER.

Witnesses:
HOWARD D. ADAMS,
WM. C. WOOD.