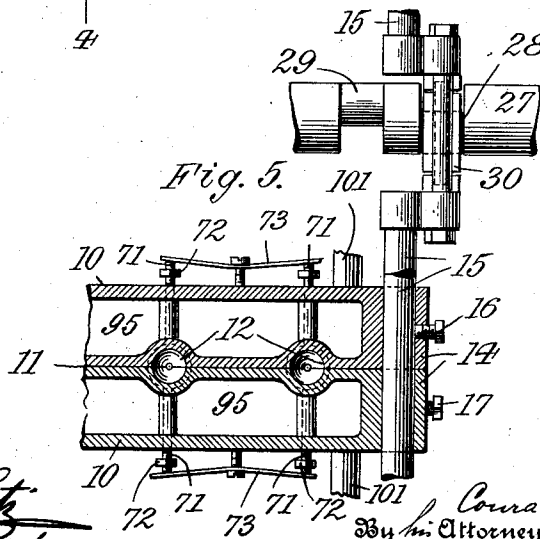
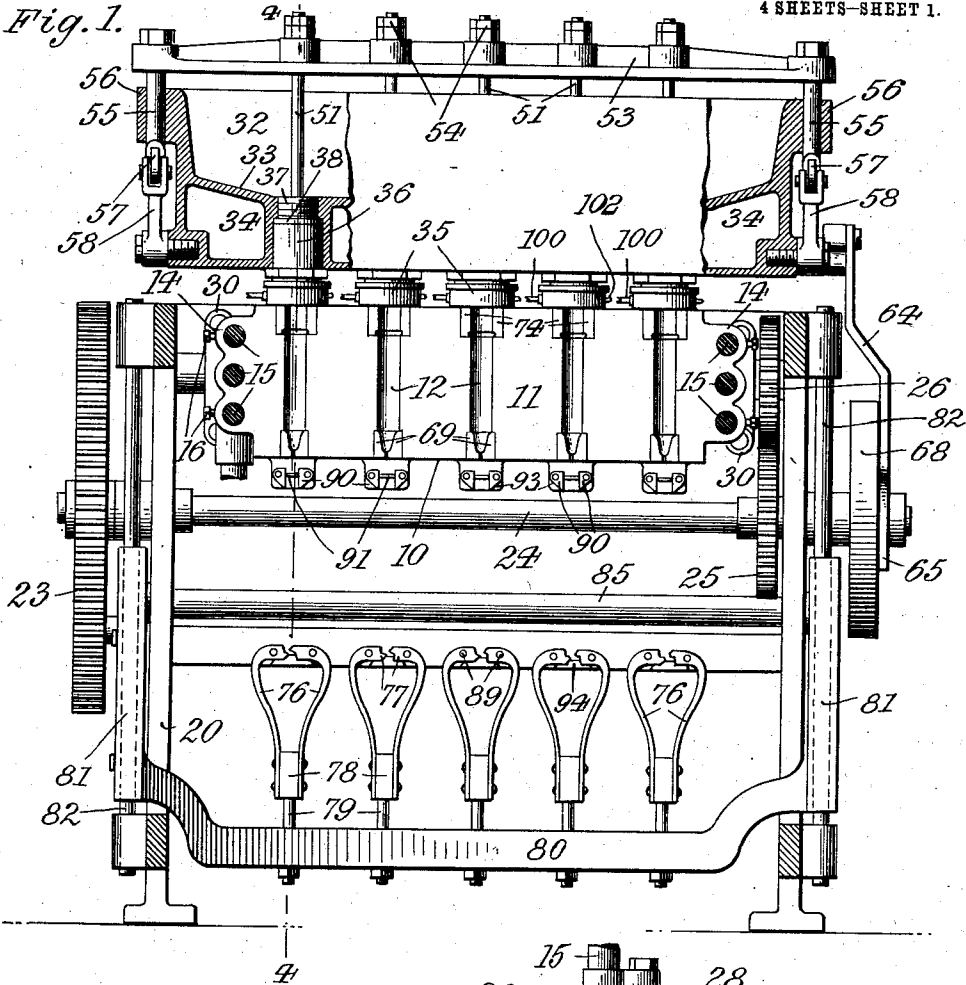


C. NORDFORS.
MACHINE FOR AND METHOD OF MAKING CANDLES.
APPLICATION FILED JAN. 30, 1911.

1,010,788.

Patented Dec. 5, 1911.

4 SHEETS—SHEET 1.



Witnesses:
Julius Lutz
Katharine Koch

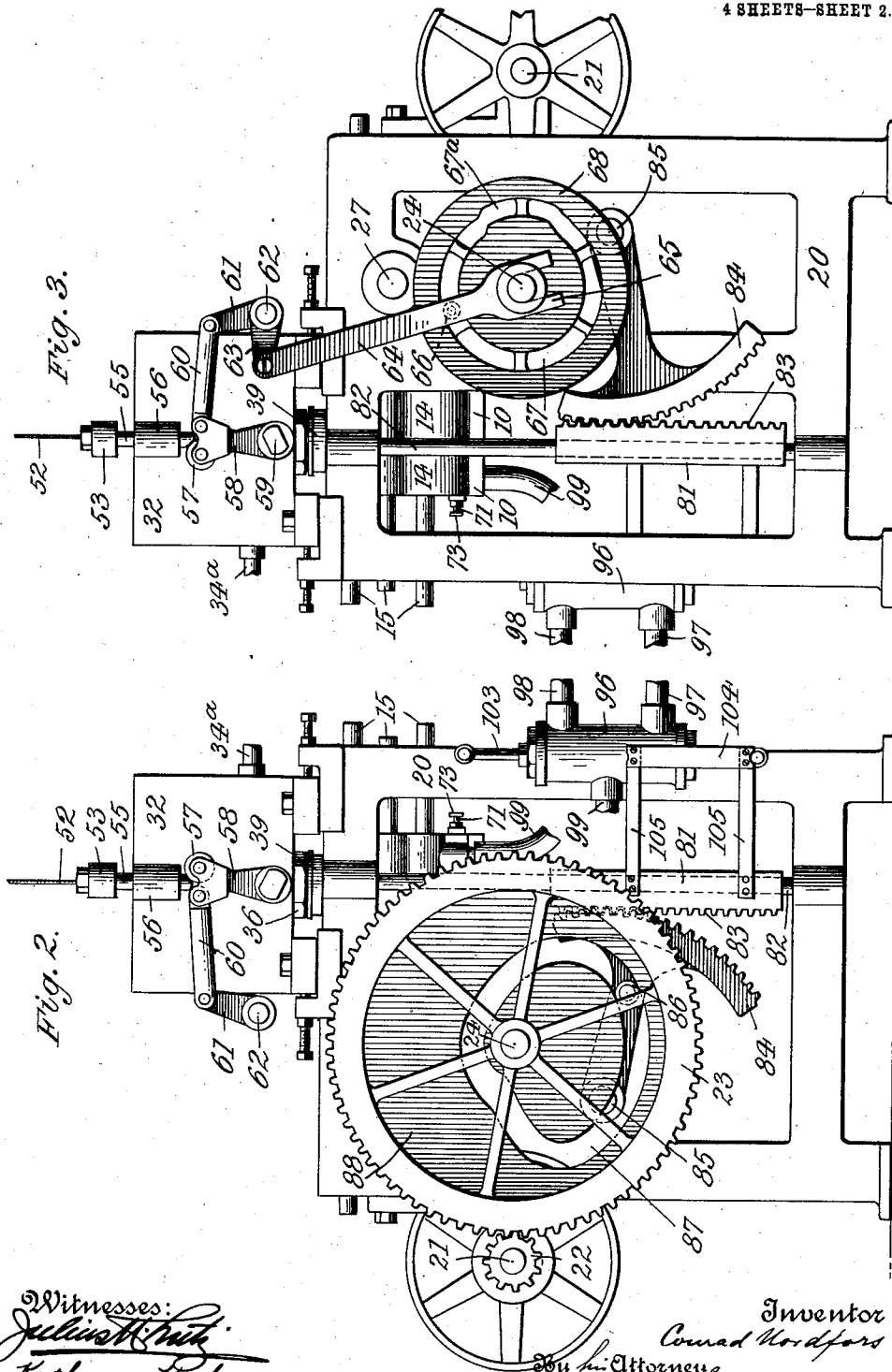
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4 SHEETS-SHEET 2.



Witnesses:
Julius H. Pich
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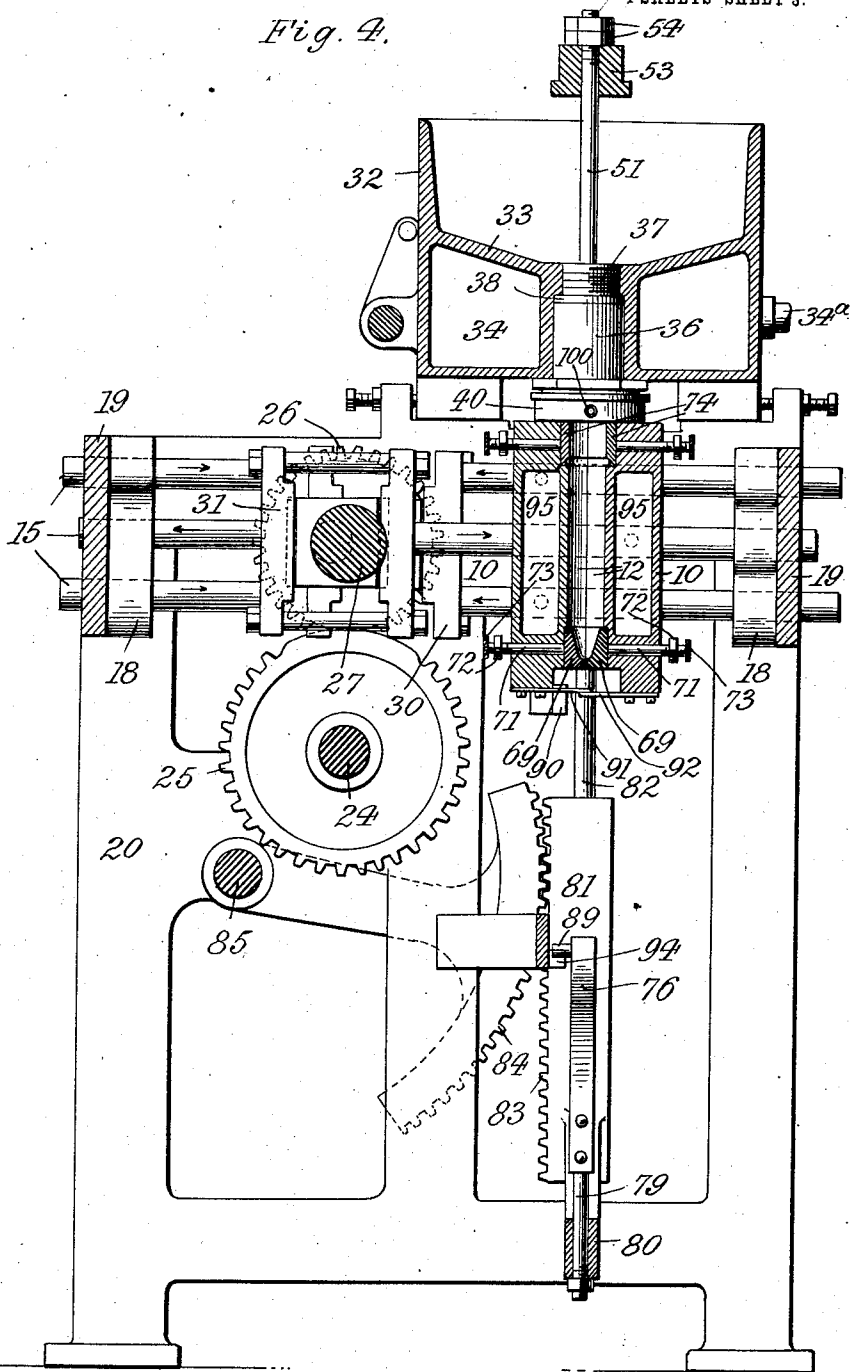
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4 SHEETS-SHEET 3.

Fig. 4.



Witnesses:
Julius H. Koch
Katherine Koch

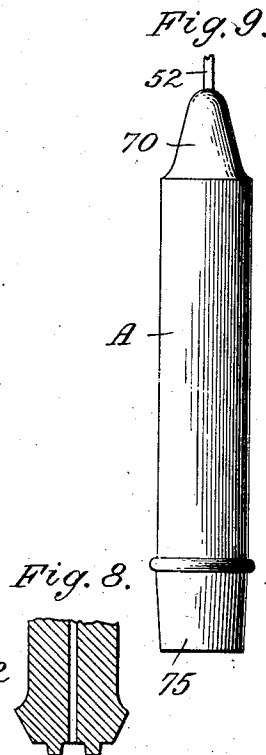
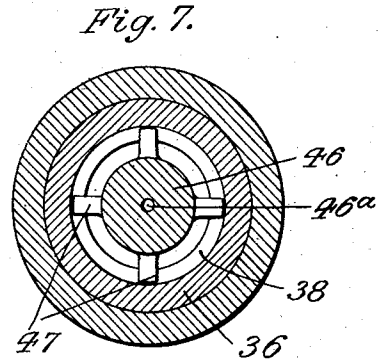
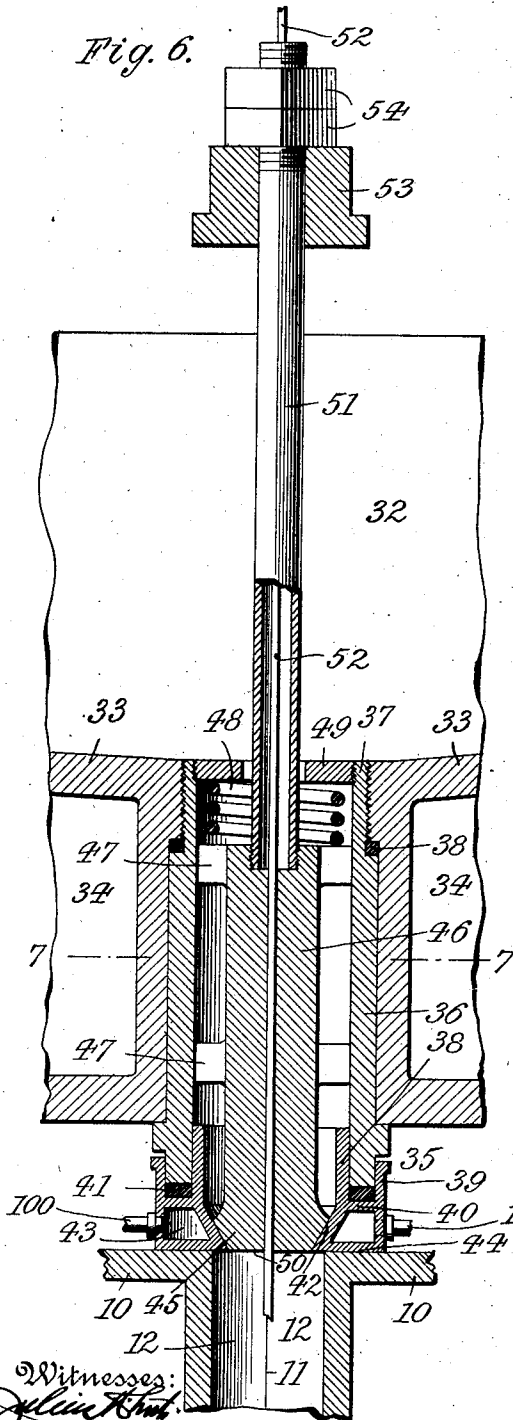
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4 SHEETS-SHEET 4.



Witnesses:
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UNITED STATES PATENT OFFICE.

CONRAD NORDFORS, OF JERSEY CITY, NEW JERSEY.

MACHINE FOR AND METHOD OF MAKING CANDLES.

1,010,788.

Specification of Letters Patent.

Patented Dec. 5, 1911.

Application filed January 30, 1911. Serial No. 605,384.

To all whom it may concern:

Be it known that I, CONRAD NORDFORS, a citizen of the United States, residing at Jersey City, county of Hudson, and State of New Jersey, have invented new and useful Improvements in Machines for and Methods of Making Candles, of which the following is a specification.

This invention relates to a machine of novel construction for forming candles in such a manner that they will be homogeneous throughout and require no further trimming or finishing after being cast. Furthermore the machine greatly reduces the time required for casting so that its output is materially increased and that an improved article is produced in a minimum time and at a greatly reduced cost.

The invention also comprises a novel method of making candles.

In the accompanying drawing: Figure 1 is a front elevation partly in section and partly broken away of my improved candle making machine; Fig. 2 a left hand end view of the machine; Fig. 3 a right hand end view thereof; Fig. 4 a vertical section on line 4—4, Fig. 1; Fig. 5 a horizontal section through part of the mold blocks and adjoining parts; Fig. 6 a longitudinal section through one of the inlet valves and adjoining parts; Fig. 7 a cross section on line 7—7, Fig. 6; Fig. 8 a detail of a modification of the valve plug, and Fig. 9 shows a candle made by my improved machine.

The machine comprises essentially a pair of hollow mold blocks 10 having opposed flat faces 11 which are adapted to be either brought into mutual contact or to be retracted. Within these faces are provided a plurality of opposed vertical casting recesses 12 each corresponding in size to one-half of the candle to be made. When the mold is closed, each pair of opposed recesses 12 forms a peripherally closed matrix for one candle, while upon the opening of said mold, the finished candles may be readily withdrawn without interfering with either of the mold sections.

Blocks 10 are provided with end flanges 14 having a plurality of perforations which are adapted for the accommodation of horizontally reciprocative guide rods 15, the drawing showing three of such rods. One of the mold blocks 10, say the rear block is, by clamp screws 16, secured to the upper

and lower rods 15, while the front block is, by screws 17 clamped to the central rod. Rods 15 are guided in corresponding bearings 18 formed on traverses 19 of the machine frame 20.

The desired reciprocative movement is imparted to rods 15 from a power shaft 21 through pinion 22, gear wheel 23, countershaft 24, gear wheels 25, 26 and crank shaft 27. The latter is provided with two diametrically opposed cranks 28, 29 of which crank 28 is encompassed by a cross head 30, while crank 29 is encompassed by a cross head 31. Cross head 30 is secured to the upper and lower rods 15, for which purpose the latter are made sectional as illustrated in Figs. 4 and 5. Cross head 31 is secured to the central rod 15 which is also made sectional. It will be seen that upon a rotation of shaft 27, the upper and lower rods 15 are moved in a direction opposite to that of the central rod. In this way both mold blocks 10 are simultaneously reciprocated in opposite directions to produce the desired alternate opening and closing of the molds.

Above blocks 10 there is mounted on frame 20 a tank 32 containing the material from which the candles are to be cast. Tank 32 is provided with a bottom 33 that preferably slopes toward the center of the mold, while a heating chamber 34 below such bottom which receives a suitable heating medium through pipe 34^a maintains the candle material in a liquefied state. The flow of said material into the mold-recesses above referred to, is controlled by valves 35, one of such valves being located at the bottom of the tank above each mold-recess. Each valve consists essentially of a tubular sleeve 36 having a reduced section 37 which is tapped into a correspondingly threaded opening of tank 32, a suitable packing 38 preventing the escape of the molten material. The lower protruding end of sleeve 36 is straddled by the inner and outer flanges 38, 39 respectively of an annular shoe 40, while a suitable cushion or resilient member 41 tends to force the shoe downward. Flange 38 merges into a tapering valve seat 42 which is surrounded by a heating and cooling chamber 43 hereinafter referred to. The flat bottom 44 of shoe 40 contacts with the upper flat faces of blocks 10 against which it is forced by resilient member 41.

Seat 42 is adapted to be engaged by the

conical base 45 of a valve plug 46 provided with radial arms 47 that insure a true axial movement of plug 46 within sleeve 36. A spring 48 interposed between plug 46 and a ring 49 tapped into sleeve 36, tends to maintain the plug in its lowered position. The lower face 50 of plug 46 is flush with the base 44 of shoe 40 when the valve is closed as illustrated in Fig. 6. Into each plug 46 is tapped a wick-tube 51 that communicates with a central bore 46^a of the plug, said bore being of a diameter just sufficient to accommodate a wick 52 which is supplied from a suitable reel (not shown). Tubes 51 pass through corresponding perforations of a traverse 53 and carry at their upper ends adjusting nuts 54. Traverse 53 is vertically reciprocated by plungers 55 slidably mounted in perforated lugs 56 of tank 32. The beveled lower faces of plungers 55 are engaged by rollers 57 carried by arms 58 which are pivoted to tank 32 at 59. To arms 58 are fulcrumed links 60 which are in turn pivoted to levers 61 fast on a transverse shaft 62. To the latter is also secured a lever 63 pivoted to a rod 64 the lower forked end 65 of which straddles shaft 24. A roller 66 of rod 64 engages the groove 67 of a cam disk 68 fast on shaft 24. When the bulged section 67^a of groove 67 is engaged by roller 66, rollers 57 are swung underneath rods 55 thereby raising traverse 53 and opening valves 35 to permit the molten candle material to flow into recesses 12 of the mold blocks. When roller 66 engages the reduced section of groove 67, rollers 57 are withdrawn from underneath rods 55 to permit traverse 53 to descend by gravity until plugs 46 become seated and valves 35 are thus closed.

In order to prevent sticking of the finished candle to one of the mold halves while the latter is open, blocks 10 are provided with a plurality of countersunk slidable auxiliary mold-sections 69 that are recessed to form the tips 70 of candles A. Sections 69 have stems 71 that traverse blocks 10 and carry at their outer ends adjusting nuts or abutments 72, while suitable springs 73 tend to force the auxiliary mold-sections 69 inward. It will be seen that while the mold blocks 10 begin to open, sections 69 will remain in contact with each other until abutments 72 are engaged by the outer sides of blocks 10 to then participate in the opening of the molds. In this way, the finished candles are maintained in their centered position during the beginning of the mold opening, to insure their proper separation from the mold-halves. If desired, similar upper auxiliary mold-sections 74 may be provided at the top of the mold blocks 10 which maintain the foot 75 of each candle centered while the mold begins to open.

For lowering the finished candles to re-

move them from the opened mold, and to simultaneously introduce a fresh wick into the latter, a pair of springy grippers 76 are arranged vertically below the center of each casting recess 12. Grippers 76 are provided with stepped jaws 77 and have the tendency to close upon the depending wick end. The grippers are secured to the heads 78 of pins 79 that are carried by a traverse 80. The latter is provided at its ends with perforated uprights 81 which are vertically slidable on rods 82 constituting part of the machine frame. Uprights 81 are toothed as at 83 to engage toothed sectors 84 which are fast on a rock shaft 85. One of the sectors 84 is provided with a roller 86 that engages a cam groove 87 of a disk 88 that forms part of gear wheel 23 and imparts the desired vertically reciprocative movement to grippers 76. The latter are provided with pins 89 which are adapted to engage a pair of abutments 90 secured to the rear mold-half and straddling a cutter 91 also carried by said half, said cutter being adapted to engage a similar cutter 92 of the other mold moiety. Abutments 90 have diverging outer faces 93 along which the pins 89 ride when the traverse 80 has nearly completed its up stroke thereby opening the grippers. When pins 89 clear abutments 90, the grippers will collapse to grasp the wick end depending from the finished candles. Before the grippers start their descent, the mold opens, so that abutments 90 are withdrawn from the paths of pins 89. During the subsequent descent of the grippers, the candles are withdrawn from the open mold-recesses, thereby introducing fresh wick-sections into said recesses. Shortly before completing their downstroke, pins 89 engage lower wedge-shaped abutments 94 that open the grippers and release the candles previously held thereby.

Means are provided for automatically admitting a heating medium into the chambers 95 of mold blocks 10 while the latter are opened and for admitting a cooling medium thereto while the molds are closed. In this way the molds are preheated to insure an even flow of material and a smooth surface of the cast, while the subsequent chilling serves to accelerate the setting of the candles. To produce this result, a valve 96 is provided which admits either hot water, steam, etc., from a supply pipe 97 or cold water from a supply pipe 98 through pipe 99 into chambers 95. Pipe 99 is by branches 100 connected with chambers 43 of valves 35 so that the plugs 46 are uniformly heated or cooled together with the molds, as will be readily understood. The spent heating or cooling medium is discharged from the molds and valves through suitable outlets 101, 102 respectively. The valve stem 103 of valve 96 passes through

the top and bottom of the latter, and is adapted to be engaged by a rod 104 secured to one of the uprights 81 by arms 105.

In Fig. 8 the valve plug 46 is shown to be provided with a pair of depending lugs 106 which constitute candle centering means during the opening of the mold, and may be used in lieu of the auxiliary mold sections 74.

The machine may be provided with suitable means for imparting intermittent rotary motion to shaft 21 and for adjusting the intervals of rest between the periods of motion. This adjustment has for its object to control the time during which the molds remain closed and during which the cast is exposed to the action of the chilling medium. Thus the machine may be adapted to operate upon different materials and to mold candles of various dimensions. Such means are fully disclosed in Patent #873,073 granted to me December 10th, 1907, so that it is not deemed necessary to here further discuss them.

Figs. 1, 2, 3, 4 and 5 show the parts of the machine in the position which they occupy while the molds are being chilled. During nearly all of this period valves 35 are maintained open, to insure the formation of candles of uniform structure. It is obvious that during the solidification of the previously molten candle material, said material will first be cooled near its circumference where it is in contact with the cooled mold.

As the chilling process is accompanied by a partial contraction of the material, central holes are liable to form which is more particularly true when the cooling medium has a comparatively low temperature thereby quickly cooling the cast candles. By maintaining the valves 35 open during the chilling process, all central cavities are replenished with molten material, so that candles of uniform structure are produced in a minimum time.

After the candles have sufficiently hardened, shaft 21 is caused to perform a partial rotation just sufficient to withdraw rollers 57 from plungers 55 and thereby effect a seating of plugs 46, whereupon shaft 21 again comes to a standstill.

As the lower faces of the plugs 46 are now flush with the top of the mold, the candles receive a smooth bottom finish and do not require any subsequent trimming or shaping operation hitherto generally necessary. To permit this slight movement of the traverse while the mold remains positively closed, wheels 25, 26 are mutilated to constitute a Geneva movement as illustrated in

Fig. 4. During the subsequent rotation of shaft 21, grippers 76 ascend to be spread by abutments 90 and to then close upon the wick ends depending from the tips of the now finished candles. The unmutilated section of wheel 25 next comes into engagement

with the similar section of wheel 26, so that mold blocks 10 are opened, while auxiliary mold sections 69, 74 maintain the candles properly centered during the start of the mold opening operation. After the molds together with the auxiliary sections have sufficiently opened, traverse 80 descends to lower the candles out of the mold, whereupon the latter again closes. When grippers 76 have nearly reached their lowermost position, pins 89 engage the wedge-shaped abutments 94, so that the jaws 77 are opened to release the wicks of the candles. About simultaneously therewith the cutters 91, 92 of the closing mold-halves engage the wicks immediately above the bottom of the candles to sever the latter from the fresh wick-sections which have meanwhile been drawn through the mold-recesses. The candles will thus be free to be removed in any suitable manner.

During the ascent of the grippers, rod 104 had engaged the top of valve stem 103 to raise the latter and thereby close pipe 98 and open pipe 97. In this way steam or another heating medium was admitted into chambers 95 and 43 to heat mold 10 and shoes 40 prior to the casting of the next set of candles. As soon as the mold is closed, traverse 53 rises to open the valves 35 and admit a new charge of candle material into the mold recesses. When the grippers have nearly completed their down stroke, pipe 97 is closed, while pipe 98 is opened to admit the chilling medium into the molds for solidifying the casts.

It will be seen that by the construction described, candles are produced which are in marketable condition without requiring any trimming, cutting or other finishing operation. Owing to the peculiar construction of the valve plugs 46 the flat bottom of which shapes the desired flat candle bottom, and as the wick is severed about flush therewith, a neat appearance of the finished article is obtained. As valves 35 are maintained in the open position nearly until the candles are removed from the molds, the formation of cavities within the candles is effectively prevented, even if the chilling takes place in a minimum amount of time. Hence the output of the machine is greatly increased and the costs of manufacture correspondingly reduced.

Although the drawing shows five molding recesses constituting a mold unit, it is obvious that any other number thereof may be combined into one machine.

I claim:

1. In a machine of the character described, a mold comprising a pair of opposed mold blocks, said blocks having a plurality of alined perforations at their ends, a pair of rods passing through the perforations of each block-end, one block being secured to

one of such rods, while the other block is secured to the other rod, and means for simultaneously reciprocating said rods in opposite directions, whereby the mold is alternately opened and closed.

2. In a machine of the character described, a mold comprising a pair of opposed mold blocks, said blocks having a plurality of alined perforations at their ends, a pair of rods passing through the perforations of each block-end, one block being secured to one of such rods while the other block is secured to the other rod, a cross head connected to each rod, a crank shaft engaging the cross head, and means for intermittently rotating the crank shaft.

3. In a machine of the character described, a pair of mold blocks having opposed casting recesses, means for opening and closing said blocks, means for admitting a moldable material into the recesses when the mold is closed, means for solidifying said material to form a cast, and means for maintaining said cast centered within the recesses during the beginning of the opening of the mold, whereby the cast is prevented from sticking to one of the receding recesses said last named centering means forming part of the mold blocks and movable in unison therewith during the remainder of the mold opening operation.

4. In a machine of the character described, a pair of mold blocks having opposed casting recesses, combined with countersunk auxiliary mold sections slidable in the mold blocks and having casting recesses that communicate with the block recesses and means for limiting the stroke of said sections.

5. In a machine of the character described, a pair of mold blocks having opposed casting recesses, means for simultaneously reciprocating said blocks in opposite directions, auxiliary mold sections slidable in the mold blocks and having casting recesses that communicate with the block recesses, springs influencing said auxiliary mold sections, and means for limiting the stroke of said section.

6. In a machine of the character described, a pair of mold blocks having opposed casting recesses, means for simultaneously reciprocating said blocks in opposite directions, auxiliary mold sections slidable in the mold blocks and having casting recesses that communicate with the block recesses, stems on said blocks, springs engaging said stems, and abutments on the stems that limit the stroke thereof.

7. In a machine of the character described, a pair of mold blocks having opposed casting recesses, means for simultaneously reciprocating said blocks in opposite directions, a pair of upper and lower auxiliary mold sections slidable in the mold blocks

and having casting recesses that communicate with the block recesses and means for limiting the stroke of said section.

8. In a machine of the character described, a split mold adapted for casting a candle having a depending wick, grippers below said mold, means for vertically reciprocating the grippers, means actuated at the end of the up stroke of the grippers for opening and subsequently closing the grippers upon the wick, and means actuated at the end of their downstroke for opening the grippers to release the wick.

9. In a machine of the character described, a split mold adapted for casting a candle having a depending wick, grippers below said mold, means for vertically reciprocating the grippers, means actuated at the end of the up stroke of the grippers for opening and subsequently closing the grippers upon the wick, means actuated at the end of their downstroke for opening the grippers to release the wick of the lowered candle, and means for severing the wick above the candle.

10. In a machine of the character described, a split mold adapted for casting a candle having a depending wick, a pair of vertically reciprocative grippers having stepped jaws that are adapted to grasp the wick, pins on said jaws, and upper and lower abutments adapted to be engaged by the pins for opening the jaws.

11. In a machine of the character described, a mold comprising a pair of horizontally reciprocative blocks having flat upper faces, a tank above the mold, a valve on the tank having a flat bottom and being adapted to establish communication between tank and mold, and means for maintaining a tight fit between the valve bottom and the top of the mold blocks during the opening and closing of said blocks.

12. In a machine of the character described, a mold comprising a pair of horizontally reciprocative blocks having flat upper faces, a tank above the mold, a valve on the tank having a flat bottom and being adapted to establish communication between tank and mold, a shoe on the valve, and means for forcing said shoe against the top of the mold blocks.

13. In a machine of the character described, a mold, a tank above the mold, a valve adapted to establish communication between tank and mold and having a perforated plug, a wick tube extending upwardly from said plug, and means for engaging said tube for raising and lowering the plug.

14. In a machine of the character described, a mold comprising a pair of horizontally reciprocative blocks having flat upper faces, a tank above said mold and having a threaded opening, a heating chamber below said tank, a downwardly protruding

sleeve surrounded by the heating chamber and tapped into the tank-opening, a shoe straddling the protruding end of the sleeve and having a valve seat said shoe engaging the flat mold faces, a resilient member between sleeve and shoe, and a valve plug adapted to engage said seat.

15 In a machine of the character described, a mold comprising a pair of horizontally reciprocative blocks having flat upper faces, a tank above said mold and having a threaded opening, a heating chamber below said tank, a downwardly protruding sleeve surrounded by the heating chamber
20 and tapped into the tank-opening, a shoe straddling the protruding end of the sleeve and having a valve seat and a flat bottom engaging the flat mold faces, a resilient member between sleeve and shoe, and a valve
25 plug adapted to engage said seat and having a flat bottom which is flush with the shoe-bottom when the plug engages the seat.

16. In a machine of the character described, a tank, a mold below said tank and
25 having a flat upper face, a valve adapted to establish communication between tank and mold, a shoe on the valve and engaging the

flat mold face, and means for alternately heating and cooling said shoe.

17. Method of casting a candle which consists in charging liquid stock around a wick, chilling and thereby shrinking said stock, and simultaneously replenishing the stock thus reduced by shrinkage to form a candle.

18. Method of casting a candle which consists in charging liquid stock around a wick, chilling and thereby shrinking said stock, replenishing the stock thus reduced by shrinkage, and discontinuing the supply of liquid stock prior to the complete setting of the chilled stock.

19. The method herein described for producing in one operation a cast finished homogeneous candle which consists in charging liquid stock around a wick, chilling and simultaneously replenishing the stock reduced by shrinkage, flattening the base of the cast, and cutting off the supply of replenishing material during the flattening operation.

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