

July 31, 1923.

1,463,504

W. D. FRANK ET AL

PRINTING MACHINE

Filed Oct. 4, 1920

2 Sheets-Sheet 1

Fig. 1.

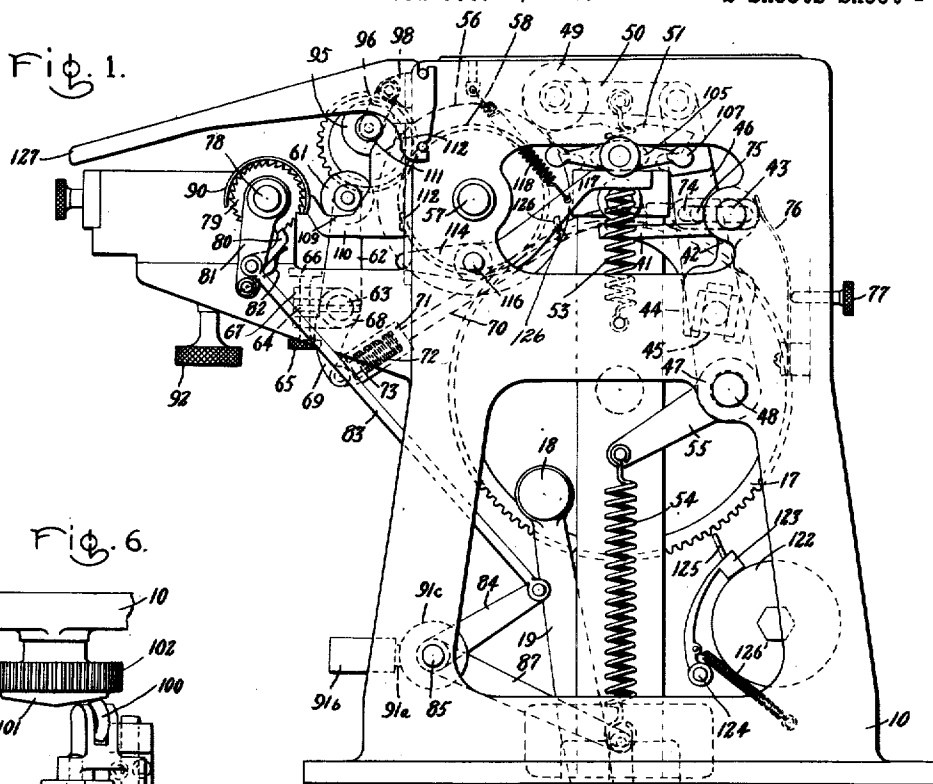


Fig. 6.

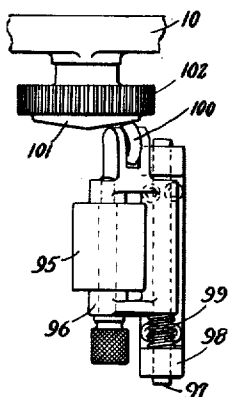
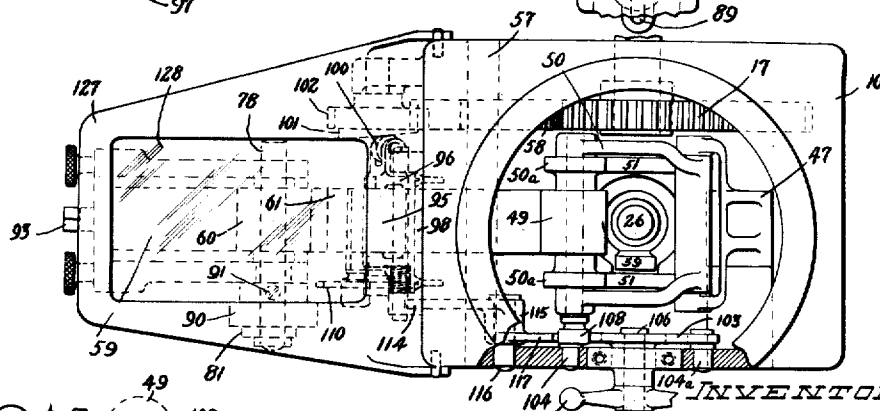


Fig. 2.



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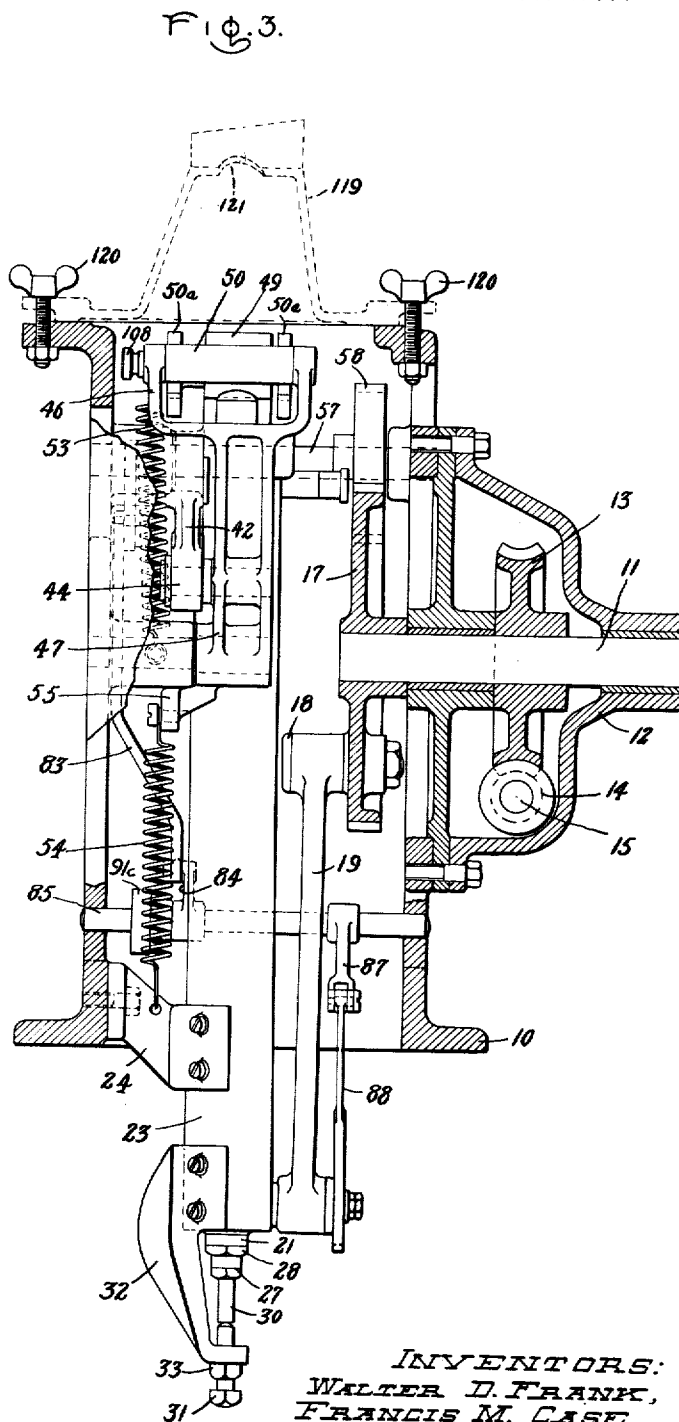
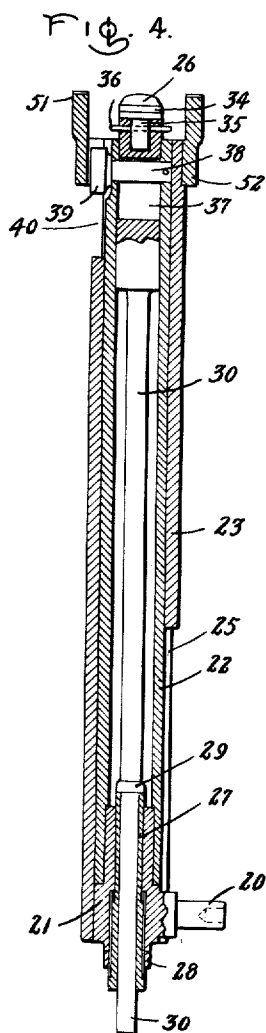
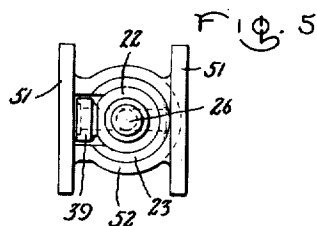
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

WALTER D. FRANK AND FRANCIS M. CASE, OF CLEVELAND, OHIO, ASSIGNORS TO
GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

PRINTING MACHINE.

Application filed October 4, 1920. Serial No. 414,460.

To all whom it may concern:

Be it known that we, WALTER D. FRANK and FRANCIS M. CASE, citizens of the United States, residing at Cleveland, county of Cuyahoga, State of Ohio, have invented certain new and useful Improvements in Printing Machines, of which the following is a specification.

Our invention relates to printing machines and more particularly to printing machines for printing characters or designs upon curved surfaces.

While our invention is applicable to printing upon a curved surface of any material, it is especially adaptable to printing monograms upon incandescent glass lamp bulbs. Heretofore in placing characters or designs such as a monogram upon glass lamp bulbs, it has been customary to use the sand blast or various etching fluids. Both of these methods are slow and more or less detrimental to the health of the operator as well as requiring a segregated place for practicing them. The methods are also more or less inconvenient and dirty.

We have obviated these disadvantages of the sand blast and the etching fluids by providing a machine for printing the monogram or other design or character upon glass lamp bulbs which may also be used for printing upon any curved or "out-of-round" surface of any material. It is to be noted that in the case of lamp bulbs, there is a thin wall of glass which would be easily crushed under an impact of any appreciable magnitude. Furthermore, blown glass articles, such as lamp bulbs, are not of the same diameter but vary within certain appreciable limits. In the machine embodying our invention we have eliminated any difficulties due to variations in bulb size or "out-of-roundness" and the contact between the printing means and the surface to be imprinted is always the same and never amounts to an impact. We prefer to provide, however, means for adjusting the amount of contact between the printing means and the surface to be imprinted. Through the use of the machine embodying our invention we are enabled in a clean, convenient, healthful way to increase the number of articles imprinted by each operator. Furthermore, a sharp, clear impression of the character or design is made on each arti-

cle imprinted. For use with incandescent glass lamp bulbs, we prefer to use a special ink which we afterwards thoroughly bake on to the glass so that the imprinted design becomes practically permanent.

Our invention will be more fully understood by referring to the accompanying drawings in which Fig. 1 is a front elevation of a machine for printing monograms on incandescent lamp bulbs according to our invention; Fig. 2 is a top plan view thereof partially in section; Fig. 3 is a side elevation partially broken away of the machine of Fig. 1; Fig. 4 is a sectional elevation of the printing mechanism; Fig. 5 is a top plan view thereof; Fig. 6 is a fragmentary view of the ink spreading roller and mechanism looking towards the roller from the left of the machine as shown in Fig. 2; and Fig. 7 is a fragmentary front elevation of the inking roller lifting mechanism.

The drive of the machine embodying our invention is arranged as follows: The frame 10, which is suitably mounted on a base (not shown), carries the main shaft 11 (Fig. 3) which also has a bearing in the cover 12 attached to the frame 10 and enclosing the worm wheel 13 on the shaft 11 and the worm 14 on a shaft 15 supported in the cover 12. The shaft 15 is driven by a motor (not shown) and in turn drives the main shaft 11. The printing means is driven from the main shaft 11 which has attached the gear 17, more fully described hereinafter, to the web of which is connected by a pin 18 a crank 19 whose other end is connected by a pin 20 (Fig. 4) to a plug 21 fastened in the end of the driving sleeve 22 of the printing means which is slidably carried in the guiding sleeve 23 fastened to the frame 10 by a bracket 24. The guiding sleeve 23 has a slot therein to give clearance to the pin 20 as the driving sleeve 22 is caused to reciprocate by the crank 19. Carried in the sleeve 22 is a rod 30 which holds the rubber or resilient stamp 26 as explained hereinafter and whose upper end slides in the sleeve 22 and whose lower end slides in a sleeve 27 which may be adjustably screwed into the plug 21 inserted in the end of the sleeve 22. The sleeve 27 after adjustment is locked into relation with the sleeve 22 by a nut 28. A shoulder 29 on the rod 30 is engaged by the

upper end of the sleeve 27 on the upward or forward movement of sleeve 22 toward the surface of the article to be imprinted and determines and limits the forward movement of the rod 30. The sleeve 27 thus serves to adjust the height of the rod 30 relative to the driving sleeve 22.

The rod 30 is positioned to allow the stamp 26 to receive ink as described herein-
after by a threaded bolt 31 (Fig. 3) which may be adjusted and screwed in a bracket 32 fastened to the lower end of the guiding sleeve 23 and which is aligned with and supports the lower end of the rod 30 when the driving sleeve 22 is in its lowermost position. A nut 33 serves to lock the bolt 31 into any position after the bolt 31 is adjusted to position the rod 30 properly with relation to the guiding sleeve 23.

The rubber imprinting stamp 26 shaped to conform substantially to the shape of the surface of the bulb at the point of imprinting and containing the desired character or design is attached to a rubber cushion 34 (Fig. 4) which in turn is attached to a cap 35. A pin 36 fastens the cap 35 in the upper end of the rod 30. Near the upper end of the rod 30 is an elongated slot 37 to give clearance to the pin 38 which serves to rotatably fasten to the driving sleeve 22 a roller 39 which causes the stamp 26 to be inked as follows: A slot 40 in the guiding sleeve 23 gives clearance to the roller 39 as the driving sleeve 22 is reciprocated. The roller 39 engages an arm 41 (Fig. 1) of the crank 42 pivoted at 43 to the frame 10 causing the other arm 44, which is forked to receive a block 45 pinned to an arm 46 of the crank 47 pivoted to the frame 10 at 48, to force the arm 46 to the right as viewed in Fig. 1. This causes an inking roller 49 rotatably supported in the links 50 connected to the end of the arm 46 to be drawn over the surface of the stamp 26, the roller guards 50^a riding on the strips 51 (see also Figs. 4 and 5) fastened to the collar 52 on the upper end of the guiding sleeve 23. The bolt 31 is so adjusted, as previously described, that the stamp 26 is positioned substantially flush with the strips 51 while the driving sleeve 22 continues on its downward stroke after the rod 30 has come in contact with the bolt 31. A spring 53 attached to the links 50 and the frame 10 tends to keep the roller guards 50^a in contact with the strips 51 on the inking stroke of the roller 49.

As the driving sleeve 22 starts on its forward stroke, the roller 39 (Fig. 1) passes out of engagement with the arm 41 and the inking roller 49 again passes over the stamp 26 through the action of a spring 54 fastened to the arm 55 of the crank 47 and to the bracket 24 which returns and tends to hold the inking roller 49 against an ink distributing roller 56 mounted on a shaft 57

carried in the frame 10. The distributing roller 56 is rotated by a gear 58 (see also Figs. 2 and 3) which is attached to the shaft 57 and meshes with and is driven by the gear 17 previously mentioned. The distributing roller 56 receives ink from the ink fountain 59 (Fig. 2) and ink fountain roller 60 through the idler or transferring roller 61 (Fig. 1) which is mounted in a yoke 62 fastened to a shaft 63 carried by the frame 10. The transferring roller 61 is caused to contact with the ink fountain roller 60 and then is brought to contact with the distributing roller 56 through the following described mechanism. A pin 64 fastened to the shaft 63 carrying the transferring roller 61 is engaged by the adjustable thumb screws 65 and 66 mounted in an arm 67 of a crank 68 rotatably carried on the shaft 63. The position of the screw 65 determines the time when the transferring roller 61 will rest against the distributing roller 56 and the position of the screw 66 determines the time when the transferring roller 61 will rest against the ink fountain roller 60. The movement of the transferring roller 61 is accomplished in the following manner: The arm 69 of the crank 68 is flexibly connected to a link 70 through a cap 71 which is pinned to the arm 69 and which contains a spring 72 encircling the end of the link 70 and bearing against the cap 71 and the washer 73 held on the end of the link 70. The other end of the link 70 has a slot 74 which is engaged by a pin 75 (see also Fig. 3) on the arm 46 of the crank 47, previously described, so that as the arm 46 is moved to the right of the view of Fig. 1 to bring the inking roller 49 into contact with the stamp 26 the link 70 is also drawn to the right and causes the transferring roller 61 to be drawn from the distributing roller 56, against which it normally rests, over to the ink fountain roller 60 to charge it with ink. A spring 76, which has one end fastened to the frame 10 and the other end held against the end of the link 70 by the adjustable thumb screw 77, tends normally to hold the transferring roller 61 against the distributing roller 56 through the mechanism just described.

The fountain roller 60 is mounted on a shaft 78 (Figs. 1 and 2) carried in the frame 10 and has a ratchet wheel 79 (Fig. 1) attached to one end of the shaft 78. The ratchet 79 is driven by a pawl 80 pinned to an arm 81 rotatably carried on the end of the shaft 78. A spring 82 fastened on the arm 81 and bearing against the pawl 80 tends to keep the pawl 80 in contact with the ratchet 79. The pawl 80 is driven through the following mechanism. A link 83 (Figs. 1 and 3) connects the end of the arm 81 with the end of an arm 84 fastened to the shaft 85 rotatably carried by the

frame 10. Fastened to the shaft 85 also is a longer arm 87, the end of which is pinned to a link 88 which in turn is connected by the pin 20 working in a slot 89 (see Fig. 1) of the link 88 to the plug 21 fastened in the end of the driving sleeve 22 of the printing means as previously described. The reciprocation of the driving sleeve 22, as described hereinbefore, through the mechanism just mentioned causes the pawl 80 to alternately advance the ratchet 79 and to retreat over the teeth thereof. The amount of advance of the ratchet 79 and consequently of the fountain roller 60 is regulated by positioning the recessed crown 90 (Figs. 1 and 2) so that the pawl 80 rides upon the surface of the crown for the desired period of time before engaging the teeth of the ratchet 79. The crown 90 is mounted on an extension of the bearing of the shaft 78 so as to shield the teeth of the ratchet 79 and is locked into position by means of a set screw 91. The movement of the fountain roller 60 from the inertia of the pawl mechanism is minimized by a brake 91^a mounted in a cap 91^b fastened to the frame 10 which acts upon a brake drum 91^c fastened to the shaft 85. A spring in the cap 91^b tends to hold the brake 91^a against the drum 91^c. The thumb screw 92 (Fig. 1) provides for vertical adjustment of the ink fountain 59 and the screw 93 (Fig. 2) provides for horizontal adjustment of the ink fountain 59 in relation to the fountain roller 60.

In order to more evenly distribute the ink on the distributing roller 56 previously mentioned, we have preferably included a spreading roller 95 (Figs. 1, 2 and 6) which is in contact with the roller 56 and which is rotatably mounted in the yoke 96 (Fig. 6) which is carried on a rod 97 fastened in the support 98 attached to the frame 10. A coiled spring 99 surrounding the rod 97 and pressing against the yoke 96 and support 98 tends to keep the yoke 96 toward the upper end (as shown in Figs. 2 and 6) of the support 98. A metal roller 100 is mounted in the upper end (as shown in Figs. 2 and 6) of the yoke 96 and is normally in engagement with the crown-shaped cam 101 (Fig. 6) on the side of the gear 102 rotatably mounted in the frame 10 and driven by the gear 58 previously described. The outline of the cam 101 is such that the yoke 96 and consequently the ink roller 95 are caused to reciprocate across the face of the distributing roller 56 when the gear 102 is driven, the spring 99 tending to keep the roller 100 in engagement with the cam 101.

The inking roller 49, the transferring roller 61, and the spreading roller 95 are preferably of rubber and it is desirable that when not in use they be kept out of contact with other surfaces to prevent them from

becoming out-of-round. We accomplish this object as regards the inking roller 49 by pinning an arm 103 (Fig. 2) to the frame 10 at 104 and 104^a so that when the arm 103 is engaged by the double pointed cam 105 (see Fig. 1), mounted on the rod 106 (Fig. 2) carried by the frame 10, as by turning the cam 105 into a vertical position by means of the handle 107, the arm 103 engages a projection 108 on the link 50 and lifts the roller 49 to clear the strips 51 or the stamp 26 according to the position of the roller 49 at the time it is lifted.

The transferring roller 61 (Fig. 1) is moved clear of the fountain roller 60 and the distributing roller 56 by the section 109 of the cam 110 and the spreading roller 95 is lifted from the distributing roller by the section 111 of the cam 110. The cam 110 is slidably held to the frame 10 by the pins 112 which work in vertical grooves in the right angle edge of the cam 110. The arm 114 (see also Fig. 2) of a crank 115 pinned at 116 to the frame 10 engages the cam 110 to raise it into engagement with the rollers 61 and 95 when the other arm 117 of the crank 115 is engaged by the lower point of the cam 105. A spring 118 fastened to the frame 10 and to the arm 117 tends to hold the cam 110 in a lowered position.

For use with incandescent lamp bulbs we have provided a bulb positioning rest 119 (Fig. 3) which is mounted on the top of the frame 10 with wing nuts 120 and aligned with the rod 30 so that the stamp 26 enters the aperture 121 of the rest 119 to imprint the bulb. A rest 119 may be easily designed to position any shape of article relative to the stamp 26. As previously described, the amount of contact between the stamp 26 and the bulb may be adjusted by adjusting the sleeve 27. We preferably provide a means to signal the operator just after the stamp 26 has entered the aperture 121 of the rest 119 to imprint the bulb. This means consists of a bell 122 (Fig. 1) mounted on the frame 10 and a striker 123 pivoted at 124 to the frame 10. An extension 125 on the striker is engaged by a projection 126 on the side of the gear 17 previously described so as to withdraw the striker 123 from the bell 122 and then release it, the spring 126^a causing the striker to return and sound the bell.

A cover 127 (Fig. 2) with glass observation window 128 is mounted over the inking mechanism for protection and is attached to the frame 10.

In operation, ink is placed in the ink fountain 59 and the drive started. The ink is carried from the fountain to the inking roller 49 through the fountain roller 60, transferring roller 61 and distributing roller 56. The inking roller 49 inks the stamp 26 on the last portion of the return stroke and

the first portion of the forward stroke of the driving sleeve 22. The operator then places a bulb on the positioning rest and, at the end of the forward stroke of the driving sleeve 22, the stamp 26 contacts with the bulb to imprint thereon the design of the stamp 26. The bell 122 is then automatically sounded and the operator removes the bulb and the cycle is repeated.

- 10 After imprinting, the bulbs are preferably heated to cause the special ink to adhere more permanently to the surface.

For the special ink which we prefer to use in connection with the machine embodying our invention, we use fusible lead borosilicate enamels and stains. This fusible enamel is ground fine and mixed with castor oil as a vehicle, although other vehicles may be used. The analysis of the enamel that has so far been found to give the best results is:

	Per cent.
25 Silica (SiO_2)	10.10
Alumina (Al_2O_3)	6.80
Lead oxide (PbO)	56.65
Boric anhydride (B_2O_3)	11.95
Lime (CaO)	2.25
Magnesia (MgO)	1.19
Cobalt oxide (CoO)	6.73
30 Alkali oxides	4.33
Total	100.00

35 This special ink has the advantage that after being baked on the glass it is practically permanent being unaffected by water, ordinary mineral acids or alkaline solutions.

40 Although we prefer to use the special ink in connection with glass surfaces, a number of inks on the market may be used. Moreover, with other than glass surfaces, it may be preferable to use a commercial grade of printing ink.

45 While we have disclosed a machine embodying our invention as used in connection with printing designs upon incandescent glass lamp bulbs, we do not wish to be limited thereto as our invention may readily be applied to printing other materials and objects of different shapes and various modifications thereof will readily suggest themselves to those skilled in the art.

What we claim as new and desire to se-

cure by Letters Patent of the United States, 55 is,—

1. A machine for printing thin glass articles, comprising a holder for receiving the article to be printed, said holder having an aperture therein through which the surface of the said article is exposed, a resilient stamp and a support therefor mounted in alignment with said aperture, and means continuously operated independently of said holder for reciprocating said stamp to and from said article through the said aperture. 65

2. A machine for printing thin curved glass articles, comprising a holder having a curved surface to receive said article, said holder having an aperture therein through which the surface to be imprinted is exposed, a resilient stamp and a supporting means therefor mounted in alignment with said aperture, and means continuously operated independently of said holder for reciprocating said stamp to and from said article through the said aperture. 70

3. A machine for printing on glass articles comprising a holder to receive said article, said holder having an aperture in the bottom thereof through which the surface to be imprinted is exposed, a resilient stamp and a supporting means therefor mounted in alignment with said aperture, means continuously operated independently of said holder for reciprocating said stamp to and from said article through said aperture, and means automatically brought into operation between successive imprints to ink said stamp. 75

4. A machine for printing on incandescent electric lamp bulbs, comprising a holder adapted to receive said bulb, said holder having an aperture therein through which the bulb surface is exposed, a resilient stamp and a supporting means therefor mounted in alignment with said aperture, means continuously operated independently of said holder for reciprocating said stamp to and from said bulb through said aperture, and means periodically and automatically brought into operation for inking said stamp. 80

In witness whereof, we have hereunto set our hands this 29th day of September, 1920. 100

WALTER D. FRANK.
FRANCIS M. CASE.