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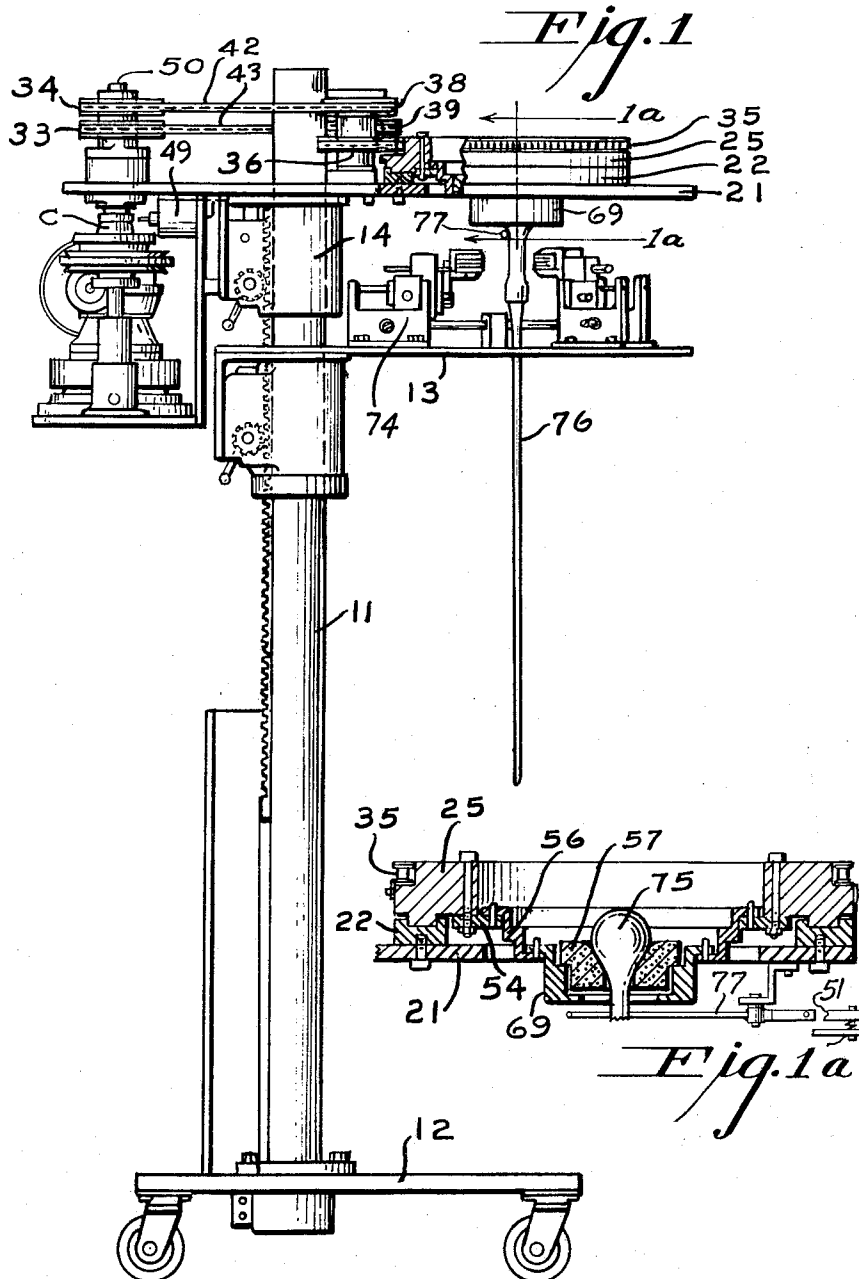
E. A. THEBADO

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GLASS BURN-OFF MACHINE

Filed May 13, 1958

3 Sheets-Sheet 1



INVENTOR.
EUGENE A. THEBADO

BY

Clarence R. Potts
ATTORNEY

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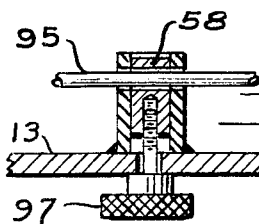
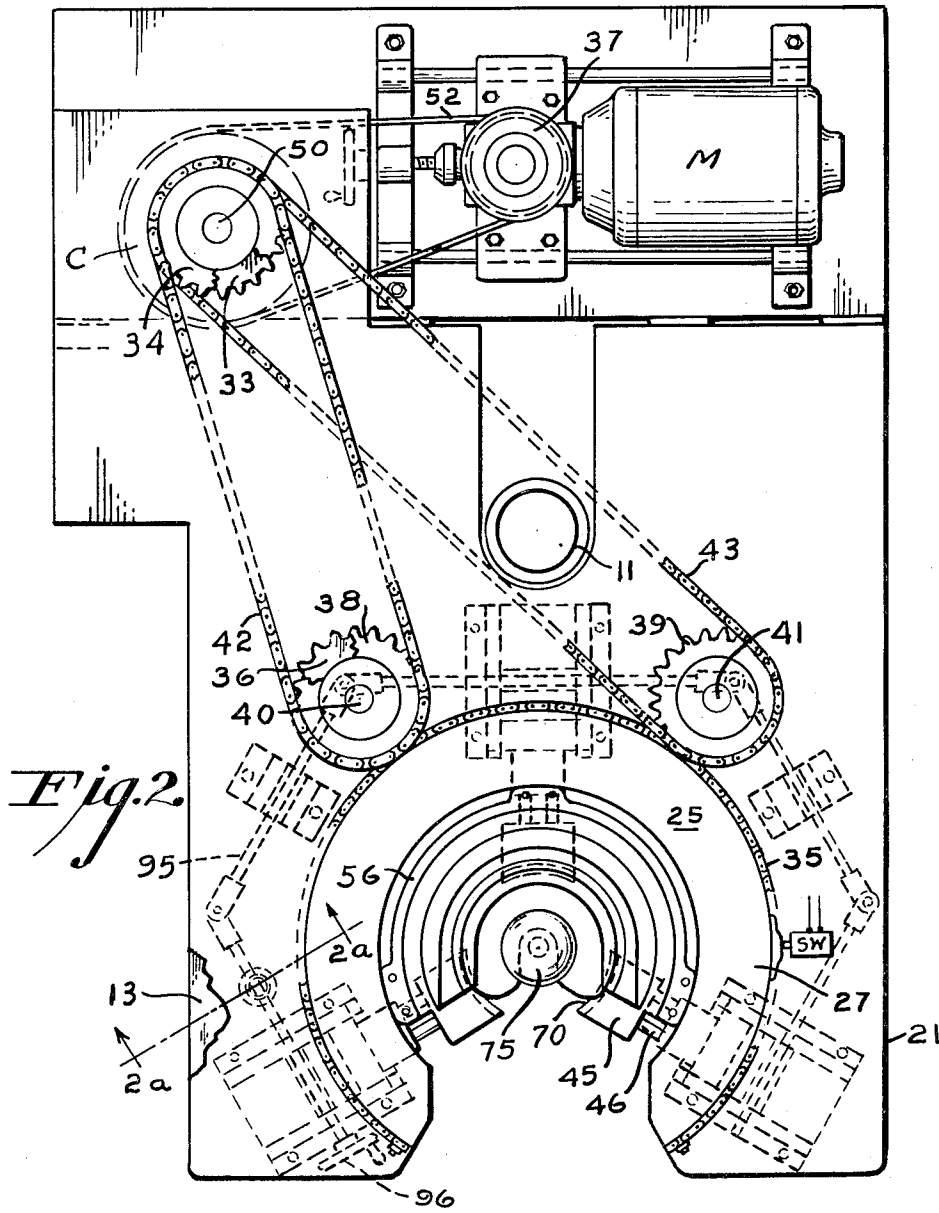
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INVENTOR.
EUGENE A. THEBADO
BY
Clarence R. Patty.
ATTORNEY

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GLASS BURN-OFF MACHINE

Eugene A. Thebado, Corning, N.Y., assignor to Corning Glass Works, Corning, N.Y., a corporation of New York

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6 Claims. (Cl. 49-7)

The present invention relates to improvements in glass severing apparatus and particularly to an apparatus especially suitable for burning off cullet from ware that has been made from a hand gather and is still attached to a blow iron.

Ordinarily hand blown articles are cracked off from a blow iron and accumulations thereof taken to a remote location where the burn-off of excessive cullet is effected by suspending an article and rotating it about its vertical axis while surrounded by a ring burner at the desired height of burn-off. Obviously the range of diameter of ware than can be efficiently burned off with a ring burner is quite limited, necessitating the availability of an assortment of different size burners to provide burn-off facilities for the wide diameter range of ware that may be made at a hand gathering position. Moreover, when burn-off operations are carried out in the foregoing fashion, frequently a large volume of ware is made before the burn-off operations are initiated only to discover, as burn-off operations are being effected, that the ware is not within required specifications.

According to the invention there is provided at the hand gathering position an article holder rotatable about a vertical axis having a side entrance through which a piece of ware may be readily loaded thereinto, while still attached to a blow iron, and into a space surrounded by three radially retracted arcuate front burners spaced 120° from one another. By providing contacts closed by the ware as it is placed in the article holder, operations are initiated to cause the burners to converge into a position with respect to the ware best suited for the burn-off operation and rotation of the holder initiated. After rotation of the holder for the predetermined time required to effect burn-off, the burners are automatically withdrawn to their initial positions and rotation of the holder halted with its side entrance available for the ready removal of the ware and for reloading. Provisions are also included for radially shifting the burner supports to modify the positions to which the burners may be advanced in accordance with diameter of ware to be burned off. Also, interchangeable burners of block form are employed to further increase the range of diameters of ware that may be burned off. Other features and advantages of the invention will become apparent from the ensuing description of the preferred form thereof.

In the accompanying drawings FIG. 1 is a side elevational view, partly in section, of a burn-off machine embodying the invention with a blown article still attached to its blow iron associated therewith.

FIG. 1a is a sectional view, on an enlarged scale, taken generally along a vertical line as viewed in the direction indicated by arrows 1a-1a in FIG. 1.

FIG. 2 is a top plan view of the machine.

FIG. 2a is a sectional view, on an enlarged scale, of a fragment of the machine taken on line 2a-2a of FIG. 2.

FIG. 3 is a side elevational view, on an enlarged scale, of one of the burner blocks, of its supporting means and of a fragment of the plate upon which such means is mounted.

FIG. 4 is a wiring and piping diagram.

Referring to the drawings in detail, the machine proper is mounted on an upright column 11 supported on a wheeled base 12. Vertically adjustable on column 11 is

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a burner support plate 13 and a vertically adjustable ware support and drive assembly 14, respectively.

The assembly 14 is provided with a platform 21 upon which is mounted a track 22 (FIG. 1) extending through an arc of approximately 300°. Rotatably arranged on track 22 is a chuck or ware holder supporting horseshoe shaped or open ring 25 (FIGS. 1, 2 and 4) also extending through an arc of approximately 300°.

To effect rotation of the open ring 25, it has a chain 35 anchored thereabout in mesh with which is one or both of two sprocket wheels such as 36 (FIGS. 1 and 2) carried on stub shafts 40 and 41, respectively, adapted to be driven by sprocket wheels 38 and 39 arranged on such shafts. Sprocket wheels 38 and 39 are adapted to be driven by chains 42 and 43 respectively trained thereabout and about similar sprocket wheels 34 and 33 (FIGS. 1 and 2) carried on a shaft 50 adapted to be driven by a motor M (FIG. 2) through a variable speed transmission 37, a drive belt 52 and a clutch C (FIGS. 1, 2 and 4), when an associated chuck engaging pneumatic unit 64 (FIG. 4) has been activated.

A flat horseshoe or ring 54 (FIG. 1a) is clamped to the under side of ring 25 and projects into its bore to serve as a support for a horseshoe shaped adapter ring 56 which is adapted for the support of a further adapter ring such as 69 which in turn supports an article chuck or holder 57. Plates 56 and 69 are, of course, interchangeable with similar adapter plates usable for the support of chucks or holders of different sizes and shapes, depending upon the shape and diameter of the ware to be worked on.

As will be evident, it is essential for facilitating loading and unloading of ware that the ring 25 always stops with its open side in register with the open side of platform 21. The driven plate of chuck C is therefore provided with an aperture 28 (FIG. 4) engageable by the shaft of a clutch lock pneumatic unit 49 whenever air is being supplied thereto and the ring 25 is in the loading or unloading position shown.

Arranged on the burner support plate 13, spaced 120° apart about a vertical center coextensive with the axial center of ring 25, are three like burner assemblies such as illustrated in FIG. 3 so positioned with respect to the open side of their support plate 13 as to enable ware to be readily passed between two of the burners particularly when in their outward positions. Each of these assemblies comprises a support such as 74 provided with two laterally spaced horizontal shafts, such as 79, upon which a carriage 53 is slidably arranged. A block burner carrier 45 is fixed to the one end of a pair of laterally spaced horizontal rods, such as 46, which are slidably projected through passages, such as 59, in an upward extension 53' of the carriage 53. Provision is made for radially moving the burner carrier 45 relative to carriage 53, comprising a pneumatic unit 44 embodied in the carriage 53 and having its piston rod 47 coupled to the rods, such as 46, by a strap 48, whereby the burner carrier 45 and a block burner 60 carried thereby may be pneumatically moved radially with respect to the common center about which the burners are arranged.

Carriage 53 is provided on its under side with a rack 93 in mesh with a pinion gear 94 carried on an articulated shaft 95 that passes transversely through support 74. One end of the shaft 95 carries a hand wheel 96 (FIG. 2) to enable the shaft to be turned to radially shift the carriage 53 and its supported burner 60 and the similar units 44¹ and 44² (FIG. 4) and their burners radially in accordance with the diameter of ware to be burned off. To lock the shaft 95 against rotation through the action of the pneumatic units such as 44, such shaft is passed through a collar 58 (FIG. 2a) movable into suitable frictional

contact with the shaft 95 by means of a knurled wheel 97.

Each block burner carrier such as 45 has a passage, such as 67, through its lower portion for supplying of fuel to a block burner such as 60 clamped therein by screws such as 61 and having a gaseous medium entrance passage, not shown, in its lower face in register with a suitable outlet in fuel supply passage 67.

Block burners such as 60 have an arcuate surface 70 (FIGS. 2 and 4) from which the gas flames issue toward the ware to be burned off. The size of the block burner employed and the radius of the arcuate surface 70, of course, depend upon the range of diameter of ware to be burned off. For example, a small burner having an arcuate surface of a radius of $1\frac{1}{2}$ " will satisfactorily serve for ware of a 2" to 4" in diameter range, whereas for ware having a diameter range of 4" to 6" a larger burner having an arcuate surface of $2\frac{1}{4}$ " radius is employed.

The pneumatic units such as 44 receive operating fluid from a conventional four-way valve V (FIG. 4), as do the pneumatic units 49 and 64, to move their burners, such as 60, radially between loading and active positions. A magnet 80 of valve V is operable over a circuit including the back contact and spring 86 of a timer T and contacts 51 closed by ware occupying the holder 57, to position the spool 30 of valve V as required to feed operating air to the outer ends of the units such as 44 and to the chuck engaging pneumatic unit 64. Alternatively a magnet 88 of valve V is operable over a circuit including contacts 71 momentarily closeable by a lobe 73 on ring 25 and the front contact and spring 86 of timer T to restore the spool 30 to its initial position. Since contacts 71 are momentarily closed near the end of each revolution of ring 25 and since a burn-off operation requires the elapsed time of several or many revolutions of such ring, the contacts 71 are connected in series with the front contact and spring 86 of timer T which are only closed after the necessary time has elapsed to effect the burn-off operation for which the timer is set.

In FIG. 4 the respective elements are shown in the positions that prevail prior to the initiation of a burn-off operation. As will be observed the spool 30 of valve V is in such position as to supply operating fluid to the front ends of the pneumatic units 44, 44¹ and 44² and to the clutch lock pneumatic unit 49.

In the operation of the apparatus shown, switch S is first closed to operate motor M. A blown article such as a bulb 75, still attached to a blow iron 76 (FIG. 1) is suspended from holder 57 (FIG. 1a). In the placement of bulb 75 into the holder 57 a controlling device comprising the hinged arm 77 (FIG. 4) closes contacts 51 which directly complete the operating circuit of motor 87 of the timing device T. This circuit extends from an X terminal of a suitable current source, through contacts 51 and the motor of T to a Y terminal of the same source. Contacts 51 also close the traced circuit from terminal X through the timer contact spring 86 and its back contact and through the magnet 80 of valve V to a Y terminal of such current source. The slide 30 of valve V is accordingly shifted to its leftward position thereby, in known manner reversing the fluid supply and exhaust passages to lines 81 and 84 in common communication with the pneumatic units 44, 44¹ and 44² respectively, thereby causing them to advance their burners into burn-off relation with respect to the suspended bulb or article of ware 75. As will be observed as air is exhausted from the front ends of units 44, 44¹ and 44² via the line 84, air is also exhausted from the clutch locking unit 49 via the branch line 90, thus enabling its spring 91 of such unit to withdraw its shaft from locking engagement with the driven plate of clutch C, thereby freeing the clutch for rotation. At the same time, air is supplied to the pneumatic clutch engaging unit 64 via a branch line 99 to effect rotation of the ware.

At the expiration of the time required to effect a burn-off operation, as determined by the pre-adjustment of

timer T, its contact spring 86 moves from its back contact to its front contact thus opening the circuit traced through the magnet winding 80 of valve V and closes a point in the traced circuit for the magnet 88 of such valve, and which is completed by the momentarily closure of contacts 71 while the rotatable support 25 is completing a revolution. The slide of valve V is accordingly restored to the position in which it is shown in which it again exhausts air from the rear ends of the units 44, 44¹ and 44² and from the clutch engaging unit 64 and again feeds air to the top end of the clutch lock unit 49, so that when the ring 25 again arrives in the rotary position shown in FIG. 1 its rotation is stopped. As will be understood when the article of ware is removed from the support contacts 51 are opened and permit restoration of the timing device T. As will be understood as a burn-off operation is completed the blow iron drops a short distance into a suitable holder from which an attendant removes it.

Also as will be understood the timing device T may be of any of a number of commercially available devices. The particular timing device shown is illustrated and described as style 310 WD 189 in a circular entitled, "Cramer Time Delay Relays" distributed by the R. W. Cramer Co., Inc., Centerbrook and Ballouville, Connecticut.

What is claimed is:

1. In an apparatus for burning moil off hollow glassware, a plurality of separately supported radially movable arcuate faced burners circumferentially spaced from one another in a circle about a space to be occupied by a workpiece, a ring for rotatably supporting a workpiece in such space having a side entrance located in alignment with the space between two of such burners through which the workpiece may be passed to suspend it from such ring, means for rotating said ring, means for radially moving such burners between their initial positions and burn-off positions, a timing device for measuring the required burn-off time, means operated under control of the workpiece upon its placement in said ring to effect the movement of said burners to their burn-off position to initiate the rotation of said ring and the operation of said timing device, and means under the joint control of said timing device and said ring for effecting restoration of said burners to their initial positions and the discontinuance of rotation of the ring at a time that the latter is in the rotary position in which its side entrance is again in alignment with the space between the same two of such burners.

2. In an apparatus for burning moil off hollow glassware, an annular workpiece supporting ring having a side entrance through which a workpiece may be passed and suspended from the bore defining border of such ring, a plurality of arcuate faced burners arranged in circumferentially spaced relation about a center coaxial with the bore of such ring with the space between two adjacent burners in vertical register with the side entrance of said ring to facilitate the lateral introduction of a workpiece therinto via its side entrance, said burners being located at a level below the ring at which it is desired to sever moil from a workpiece, means for rotating said ring, means for radially moving said burners into and out of burn-off positions, a controlling device for said means and for the ring rotating means, a timing device for determining the time allowed for a burn-off operation, means actuated by a workpiece occupying said ring to bring about the operation of said controlling device to effect the movement of said burners into their burn-off positions and the rotation of said ring and to initiate the operation of said timing device, and means under the joint control of said ring and timing device to bring about the operation of said controlling device to effect the return of said burners to their initial positions and the discontinuance of rotation of said ring at a time that its side entrance is again in vertical alignment with the specified space between two adjacent ones of said burners.

3. An apparatus as in claim 2 wherein the means for radially moving the burners comprise fluid operated cylin-

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ders and the controlling device comprises a four-way valve.

4. An apparatus as in claim 3 wherein the means for controlling the four-way valve includes an operating circuit therefor closed by the workpiece and an operating circuit therefor closed jointly by the ring and timing device respectively. **5**

5. An apparatus as in claim 2 wherein said ring rotating means includes a clutch having operating and stop operating means under control of said controlling device. **10**

6. An apparatus as in claim 2 wherein the rotating means for said ring includes two driving connections directly associated with said ring at substantially 90°

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different arcuate locations with respect thereto to retain one driving connection while the other is being disrupted by the side entrance of said ring.

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