July 24, 1934. F. C. DE LANO 1,967,766

AMPOULE SEALING MACHINE

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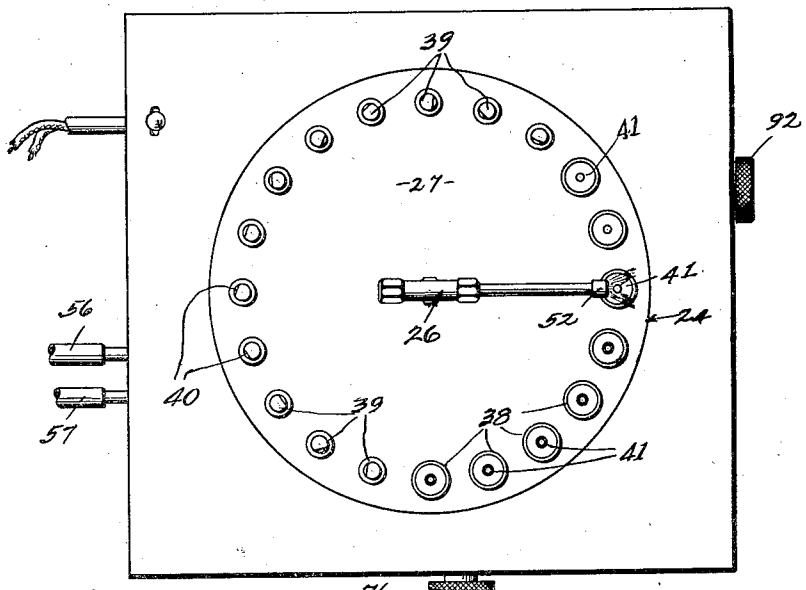


Fig. 1

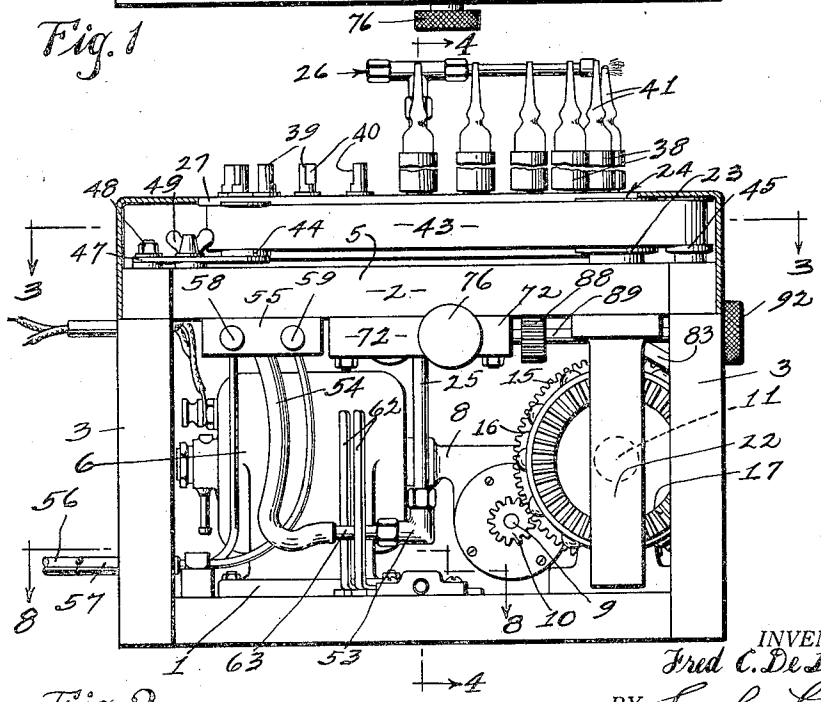


Fig. 2

INVENTOR.
Fred C. De Lano
BY Arthur L. Mack
ATTORNEYS.

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Fig. 3

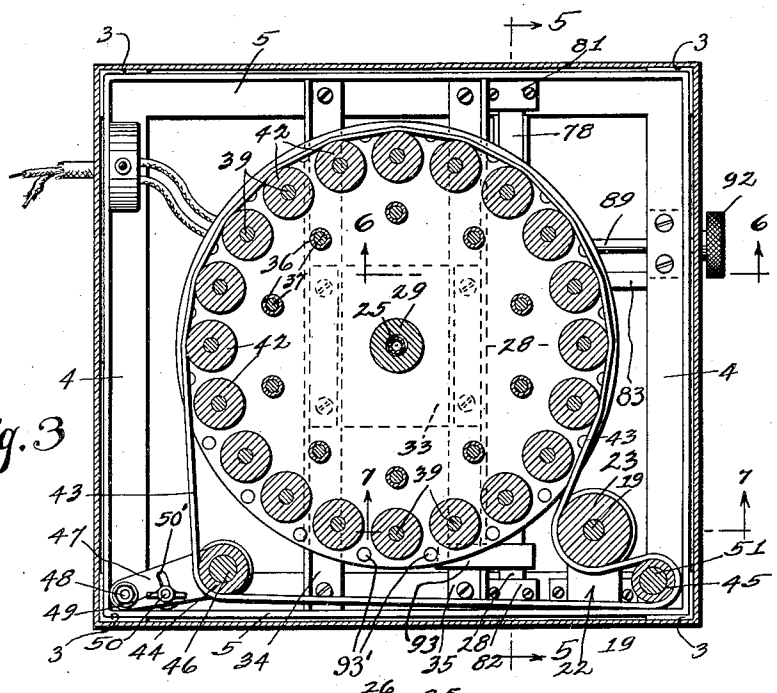
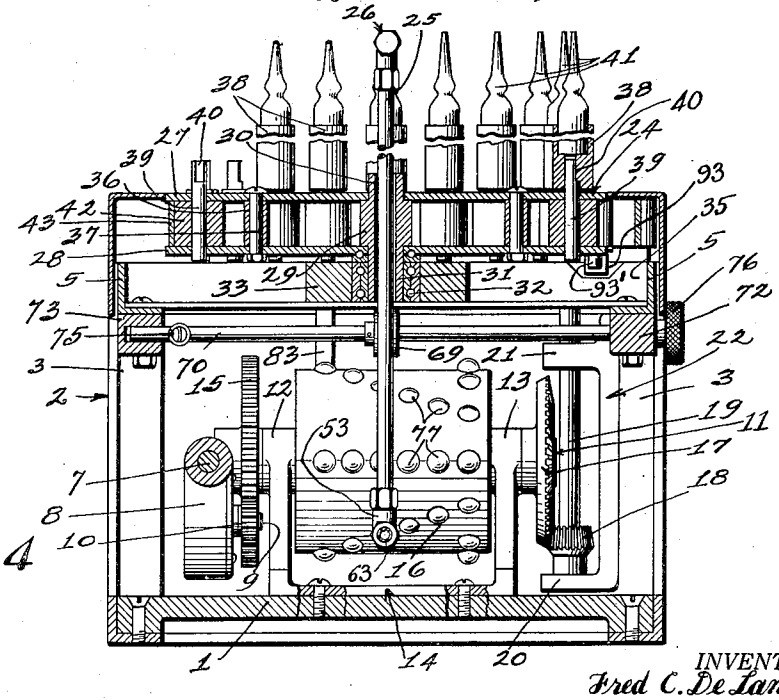


Fig. 4



INVENTOR.
Fred C. De Lano
BY Frederick L. Mack
ATTORNEYS.

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AMPOULE SEALING MACHINE

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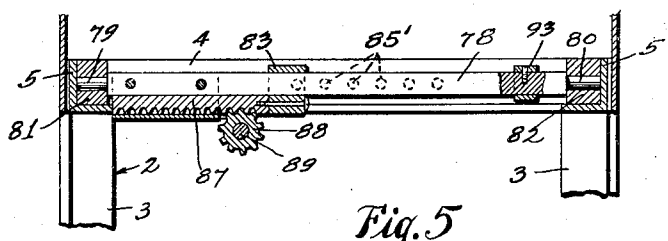


Fig. 5

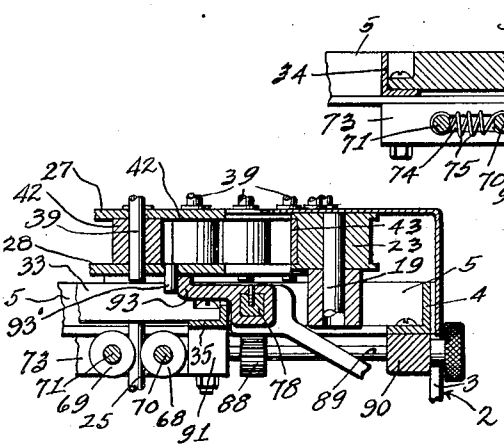


Fig. 7

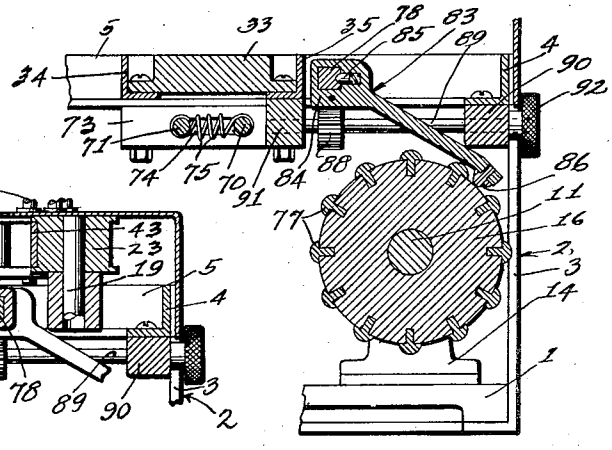


Fig. 6

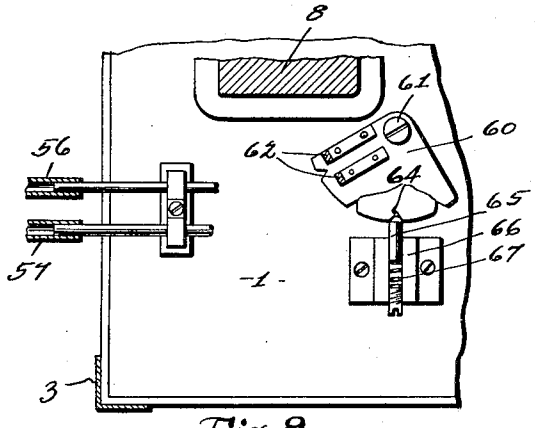


Fig. 8

INVENTOR.
Fred C. De Lano
BY Lambert L. Mack
ATTORNEYS.

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UNITED STATES PATENT OFFICE

1,967,766

AMPOULE SEALING MACHINE

Fred C. De Lano, South Pasadena, Calif.

Application June 1, 1931, Serial No. 541,362

11 Claims. (Cl. 226—30)

This invention relates to and has for an object the provision of an improved type of ampoule sealing machine designed to accommodate one or more sealing units arranged in a compact manner for automatic operation, whereby ampoules may be successively moved to and from sealing position relative to a burner, whereby the open tops of the ampoules are fused for hermetically sealing the same against the entrance of atmosphere.

In the consideration of this invention reference is made to my pending application for patent for Ampoule sealing machines, filed Oct. 30, 1929, Ser. No. 403,551.

A further object of invention is to provide an improved type of sealing unit in the form of a rotary table or disc having a plurality of rotatable ampoule holders thereon in combination with a power driven mechanism, and means for commonly connecting the power driven mechanism with the ampoule holders whereby the unit may be revolved bodily and the holders simultaneously revolved therewith relative to the table.

A further object is to so apply the power to the sealing unit that the holders for the ampoules will be rotated only throughout a necessary portion of a revolution in order to facilitate the placement of the ampoules in the holders.

Still another object is to provide means for stopping the rotation of the table on which the ampoules are supported so as to present successive ampoules to the burner and for permitting the rotation of the ampoules while the rotation of the table is stopped.

Other salient features of my invention consist in the provision of improved means for regulating the length of the sealing intervals, for adjusting the height of the burner relative to the sealing unit to correspond to the variation in height of the ampoules, together with certain other improvements which will appear as the description progresses.

In the accompanying drawings I have shown a preferred form of invention, subject to modification within the scope of the appended claims without departing from the spirit thereof. In said drawings:

Fig. 1 is a top plan view of my improved ampoule sealing machine.

Fig. 2 is a side elevation of the same with the top cover in section.

Fig. 3 is a sectional plan on line 3—3 of Fig. 2.

Fig. 4 is a sectional elevation on line 4—4 of Fig. 2.

Figs. 5, 6 and 7 are fragmentary sections on lines 5—5, 6—6 and 7—7, respectively, of Fig. 3.

Fig. 8 is a fragmentary plan on line 8—8 of Fig. 2.

As generally arranged, the mechanism is mounted on a flat base 1 formed on or secured to a skeleton frame 2, preferably formed with members of right angular cross section and including legs 3, 3 etc., at the corners, parallel side rails 4, 4, and end rails 5, 5.

On the base 1 a motor 6 is suitably mounted, the shaft 7 of which is connected with a suitable reducing gear mechanism 8, from which a driven shaft 9 is extended, and provided with a driving pinion 10. A counter-shaft 11 is supported in bearings 12 and 13 respectively, which project upwardly from a bracket 14 suitably attached to the base 1. Said counter-shaft is positively driven from the gear reducing unit 8 by means of a gear 15 fixed thereto, which meshes with the driving pinion 10. Intermediate the bearings 12 and 13 a drum 16 is mounted on the shaft 11, and outwardly of the bearing 13 a bevel gear 17 is fixed to said shaft, all as shown in Fig. 4.

Motion is communicated from the bevel gear 17 to a pinion 18 fixed to a vertical shaft 19 which is journaled in bearings 20 and 21 on a bracket 22 which is suitably secured to or formed on the frame 2.

On the upper end of the shaft 19 I provide a flanged pulley 23 for rotating the sealing table 24, which is centrally mounted on the frame 2 about the axis of the fuel supply pipe 25, having a burner 26 on its upper end above the table 24. Said table is composed of a pair of circular discs 27 and 28 which are mounted on a central hub 29 having reduced portions 30 and 31 at the top and bottom thereof respectively. The hub 31 is journaled in a frictionless bearing 32 on a block 33 which is supported on a pair of parallel rails 34 and 35, which are secured to and connect the end rails 5, 5 of the frame, as shown in Figs. 3 and 4. The discs 27 and 28 may be additionally spaced apart by means of sleeves 36 thru which bolts 37 are extended and said bolts serve to hold the discs in spaced relation as shown.

A plurality of ampoule holders 38, 38 etc. are mounted on the upper disc 27 and are fixed to the upper extended portions of short vertical shafts 39, 39 etc. which are arranged in a common concentric circle at uniformly spaced points on the table 24. The shafts 39 may be provided as shown with flats 40 and the holders 38 may be correspondingly provided with flats so that the holders will be fixed for rotation with their respective shafts. The holders have circular recesses formed therein which are open at their upper ends to receive ampoules, as at 41, 41 etc.

Intermediate the discs 27 and 28 rollers 42, 42 etc. are provided on and are fixed to the shafts 39. Thus, as shown in Fig. 3, motion may be communicated to the table 24 and to the shafts 39 by means of a continuous belt 43 which operates over the driving pulley 23, thence around the table 24 and over a substantial number of the rollers 42 thereof, thence over a tightening pulley 44,

and thence over an idler pulley 45. The pulley 44 is mounted on a pin 46 carried in the free end of an arm 47, which is adjustable about a pivot 48 and may be locked into a desired position by means of a wing nut 49 carried on a screw 50, which engages an arcuate slot 50' in arm 47.

The pulley 45 is mounted on a fixed pin or shaft 51 suitably secured to the frame 2, or the bracket 22 which supports the shaft 19. It will be noted that the burner 26 extends radially from the axis of table 24 and has a jet 52 on the end thereof arranged to provide a fish-tail flame around the reduced neck ends of the ampoules for fusing the ends thereof, and thereby sealing the ampoules.

The lower end of the burner tube 25 has an elbow 53 thereon which is connected by means of a flexible tube 54 with a suitable mixing valve 55 attached to the frame 2, the particular character of which is not material to my invention. One or more kinds of gas may be supplied to the mixing valve 55 and suitably mixed therein for delivery to the burner 26. To this end a pair of supply pipes 56 and 57 are provided which lead, respectively, to regulating valves 58 and 59. For instance, ordinary illuminating gas and oxygen may be supplied thru said pipes to the mixing valve 55 and mixed therein in suitable volume for providing a sufficient heat at the burner jet 52 for quickly and completely sealing the ends of the ampoules.

Below the burner supply pipe 25 I provide an adjusting device consisting of a quadrant 60 pivotally mounted at 61 on the base 1 and provided with upwardly extended spaced bars 62, 62 between which an extension 63 from the elbow 53 is vertically adjustable. The quadrant 60 has a plurality of notches 64, 64 formed in the periphery thereof and adapted to be selectively engaged by a pin 65 yieldably held in a block 66 against the tension of spring 67, said pin serving as a detent for the quadrant 60. Thus, as the burner 26 and its supply pipe 25 are adjusted vertically by means hereinafter described, the quadrant 60 will be self-adjusting to compensate for any tension which may be made in the flexible supply pipe 54 which would tend to move the pipe 25 from a correct position.

The burner is vertically adjusted by means of a pair of peripherally grooved frictional rollers 68 and 69 which are carried on shafts 70 and 71 respectively. Said shafts are supported on blocks 72 and 73 attached to the bottoms of the side rails 5, 5 respectively, and while the shafts are carried in separate bores in the block 72 they are supported in an elongated slot 74 in the block 73 and are resiliently connected by means of a spring 75, as shown in Fig. 6. The tension of spring 75 thus serves to draw the shafts together for frictionally engaging the rollers 68 and 69 with opposite sides of the burner supply pipe 25. The pipe 25 is adjusted by means of a finger-piece 76 attached to one of the shafts 70 or 71 and positioned externally of one side of the machine. The burner is thus held in selected position by the friction of the rollers 68 and 69 on the pipe 25.

By reference to Figs. 4 and 6 it will be observed that the drum 16 is provided with a plurality of series of rounded protuberances or buttons, as at 77. Each of said series includes a different number of the buttons 77 annularly arranged on the periphery of the drum and the buttons of the several series not only vary in number but in their peripheral spacing on the drum. The purpose of the buttons 77 is to interrupt the rotation of the table 24 for variable periods of time to correspond to the difference in size of the ampoules to be sealed.

Parallel with the axis of the drum I provide a rock shaft 78 which has a square body portion and trunnions 79 and 80 at its ends which are oscillatably supported in bearings 81 and 82 respectively attached to the side rails 5—5 of the frame. An arm 83 has one end 84 arranged to rock with but to slide on the shaft 78 by means of a spring held detent 85 which selectively engages indentations 85', 85' in a side of the shaft 78.

The arm 83 is extended outwardly and is provided with a beveled end portion 86 which rides over the periphery of the drum 16, as shown in Fig. 6, and an elongated rack 87 is either formed on the member 83 or suitably attached thereto for engagement with a pinion 88, as shown in Fig. 5. Said pinion is fixed to a shaft 89 which is journaled in bearing blocks 90 and 91 respectively suitably fixed to the top of frame 2, and said shaft is extended outwardly from the frame and is provided with a finger-piece 92 by means of which the pinion 88 may be rotated for correspondingly sliding the member 83 longitudinally on the shaft 78.

Fixed to the body of shaft 78 also is an inwardly projecting arm 93 which is adapted to engage at its inner end pins 93' which slightly extend below the bottom disc 28 of the table 24. Thus, as the drum 16 is rotated in either direction, as shown in Figs. 6 and 7, the arm 83 will be elevated at its end 86 by its movement over the buttons 77 and the stop arm 93 will be lowered simultaneously with the elevation of the arm 83 so that the arm 93 will move out of engagement with one of the shafts 39 and permit the rotation of the table 24 to an extent corresponding to the distance between the successive shafts 39, 39 etc. When arm 83 has passed over one of the buttons 77 it will be depressed in time to elevate the arm 93 for engagement with a succeeding shaft 39.

In operation, the burner 26 is adjusted to a proper height by turning the finger-piece 76 and shafts 70 and 71 to accommodate ampoules of a given size. When the motor 6 is energized the table 24 will be rotated by the friction applied to the rollers 42 by belt 43, and the rollers 42 will also be rotated relative to the table 24. When all of the shafts 39 of the table are equipped with the holders 38 ampoules are positioned in such holders as are not rotated by reason of their disengagement from the belt 43. (See Fig. 3.) The holders are then moved in succession to and from the sealing position adjacent the burner 26 by the rotation of table 24, and when each of the successive ampoules is presented to the burner the rotation of the table is stopped by the arm 93 while the rotation of the holders is continued during the sealing operation.

The ampoules may be removed from the table at any time subsequent to the sealing operation, but preferably when the rollers 42 have disengaged the belt 43, and new ampoules may be at such time placed in the holders.

It will be understood that the length of time required to complete each sealing operation varies with the size of the ampoules, the smaller ampoules requiring a shorter sealing interval, while the larger ampoules require a correspondingly longer interval. To this end the buttons 77 on the drum 16 are annularly arranged in spaced relation on the drums at varying distances apart. As shown in Fig. 4, the first set of buttons at the right end of the drum 16 are more closely spaced and are of greater number than the next adja-

cent set to the left, and the buttons may decrease in number and the spaces therebetween increase from one end to the other of the drum, as shown. It will be quite obvious that the greater the distance between the buttons 77 the longer the sealing interval will be, as the table 24 is non-rotatably held except when the arm 83 is actuated by the buttons 77.

I have provided a compact, inexpensive and efficient machine for sealing ampoules, which may include one or more sealing units of the character shown and described herein, and is economical in operation and capable of long life and much usefulness by substituting automatically operated mechanical means for manual labor, as has heretofore been customary in many cases.

What I claim is:

1. An ampoule sealing machine comprising a frame, a table rotatable on said frame, a fuel supply pipe axially disposed relative to the table and extended thereabove, a burner radially disposed above the table and connected with said pipe, a plurality of ampoule holders concentrically arranged on said table, a driving member, and a flexible power transmission member operatively connecting said driving member with certain of said holders for rotating said table on its axis and for rotating said holders on said table, said transmission member being arranged to successively discontinue the rotation of the holders during a portion of a revolution of said table for successively moving ampoules carried in said holders to and from sealing position relative to said burner.

2. An ampoule sealing machine as characterized in claim 1, including means for stopping the rotation of said table while permitting the continued rotation of the holders engaged with said transmission member while the successive ampoules are at sealing position.

3. An ampoule sealing machine as characterized in claim 1, including means for stopping the rotation of said table while permitting the continued rotation of the holders engaged with said transmission member while the successive ampoules are at sealing position, and manually operable means for varying the length of the sealing periods, for the purpose described.

4. An ampoule sealing machine as characterized in claim 1, including means for stopping the rotation of said table for predetermined intervals, and manually operable means for varying the length of the intervals in which said table is at rest.

5. An ampoule sealing machine as characterized in claim 1, including adjustable means engaging said transmission member for varying the tension thereof.

6. An ampoule sealing machine comprising a frame, a table rotatable thereon and adapted to support a plurality of ampoules in concentric position, a burner axially mounted on the table relative to the ampoules, a fuel supply pipe connected with said burner, and a pair of rotatable members frictionally engaging said pipe and manually operable for varying the elevation of said burner at will.

7. An ampoule sealing machine comprising a frame, a table rotatable thereon and adapted to support a plurality of ampoules in concentric position, a burner axially mounted on the table relative to the ampoules, a fuel supply pipe connected with said burner, and a pair of rotatable members frictionally engaging said pipe and manually operable for varying the elevation of said burner at will, said rotatable members being relatively adjustable, and means for resiliently connecting said members for tensioning the same on said pipe.

8. An ampoule sealing machine comprising a frame, a table rotatable thereon, means for intermittently rotating the table, a burner centrally mounted on said table, holders rotatably mounted on said table, a power operated mechanism including a drum having a plurality of sets of knobs thereon, a rock shaft mounted on said frame, an arm on said shaft adapted to selectively engage the knobs on said drum, and a manually rotatable member operatively connected with said arm for moving the arm longitudinally of the drum so as to engage said arm selectively with different sets of said knobs for stopping the rotation of said table for successive predetermined periods of time.

9. An ampoule sealing machine comprising a frame, a table rotatable thereon, an intermittently operable rock shaft mounted on said frame, a stop arm fixed to said shaft for successively engaging portions of and for stopping the rotation of said table, a rotatable timing shaft, a pinion thereon, an arm longitudinally adjustable on said rock shaft and provided with a rack engaging said pinion, and power operated means engaging said arm for rocking said rock shaft, said timing shaft serving to vary the length of the periods of rest of said table.

10. An ampoule sealing machine comprising a frame, a table rotatable on said frame, a plurality of ampoule holders concentrically arranged on said table, a driving member, a flexible belt operatively connecting said driving member successively with and extended around a plurality of said holders, a sealing means for the ampoules stationarily supported at a point adjacent the path of said holders, said belt being effective for rotating said table and successively presenting said holders in position adjacent the sealing means and for rotating the holders during successive sealing operations, and means including a rotatable member and a stop arm actuated by said rotatable member for intermittently stopping the rotation of said table during successive sealing operations during which intervals certain of said holders are rotated while the table is stationary.

11. An ampoule sealing machine comprising a frame, a table rotatable on said frame, a plurality of ampoule holders concentrically arranged on said table, a driving member, a flexible belt operatively connecting said driving member successively with and extended around a plurality of said holders, a sealing means for the ampoules adjacent the path of said holders, said belt being effective for rotating said table and successively presenting said holders in position adjacent the sealing means for rotating the holders during successive sealing operations, means for intermittently stopping the rotation of said table during successive sealing operations during which intervals certain of said holders are rotated while the table is stationary, and means for selectively adjusting said table stopping means for varying the sealing intervals.

FRED C. DE LANO.