June 1, 1954 J. BAIN, JR 2,679,660

NONINTERMITTENT LAMP BASE FILLING MACHINE

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Fig. 2.

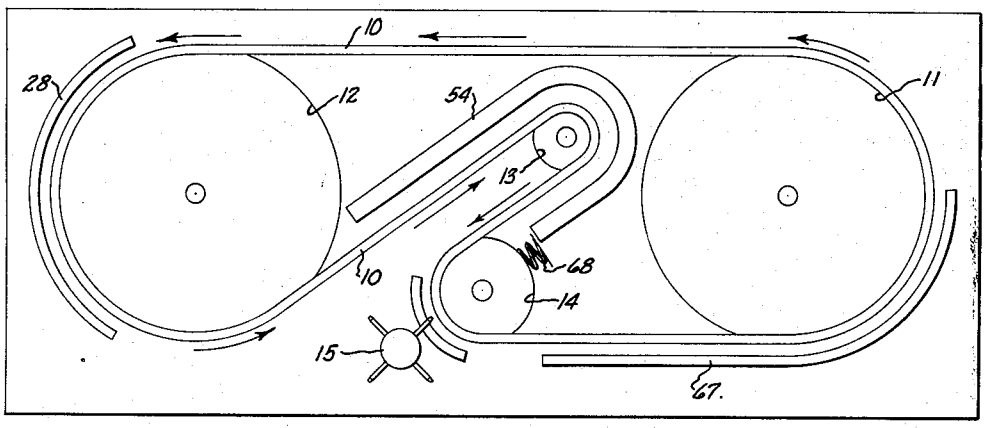


Fig. 1.

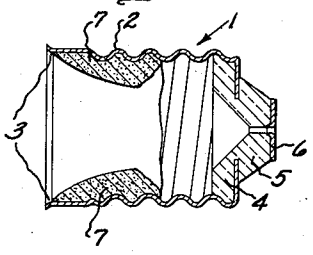


Fig. 5a.

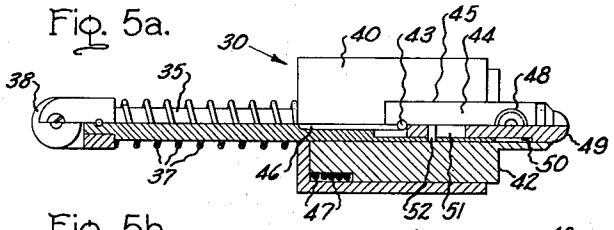


Fig. 5b.

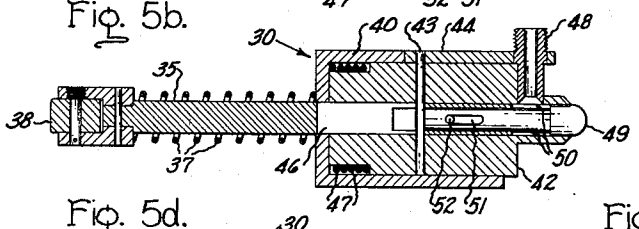


Fig. 5c.

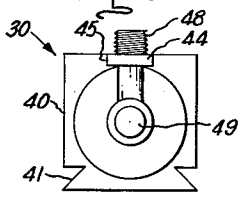


Fig. 5d.

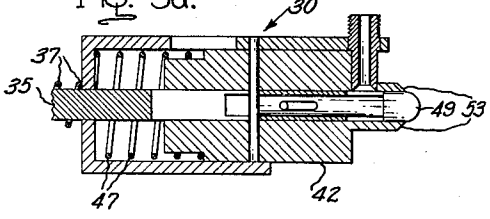
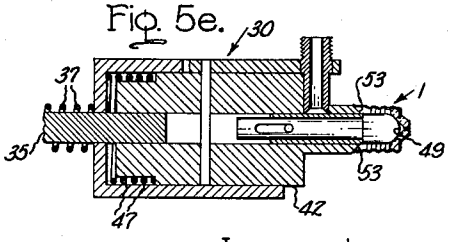


Fig. 5e.



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NONINTERMITTENT LAMP BASE FILLING MACHINE

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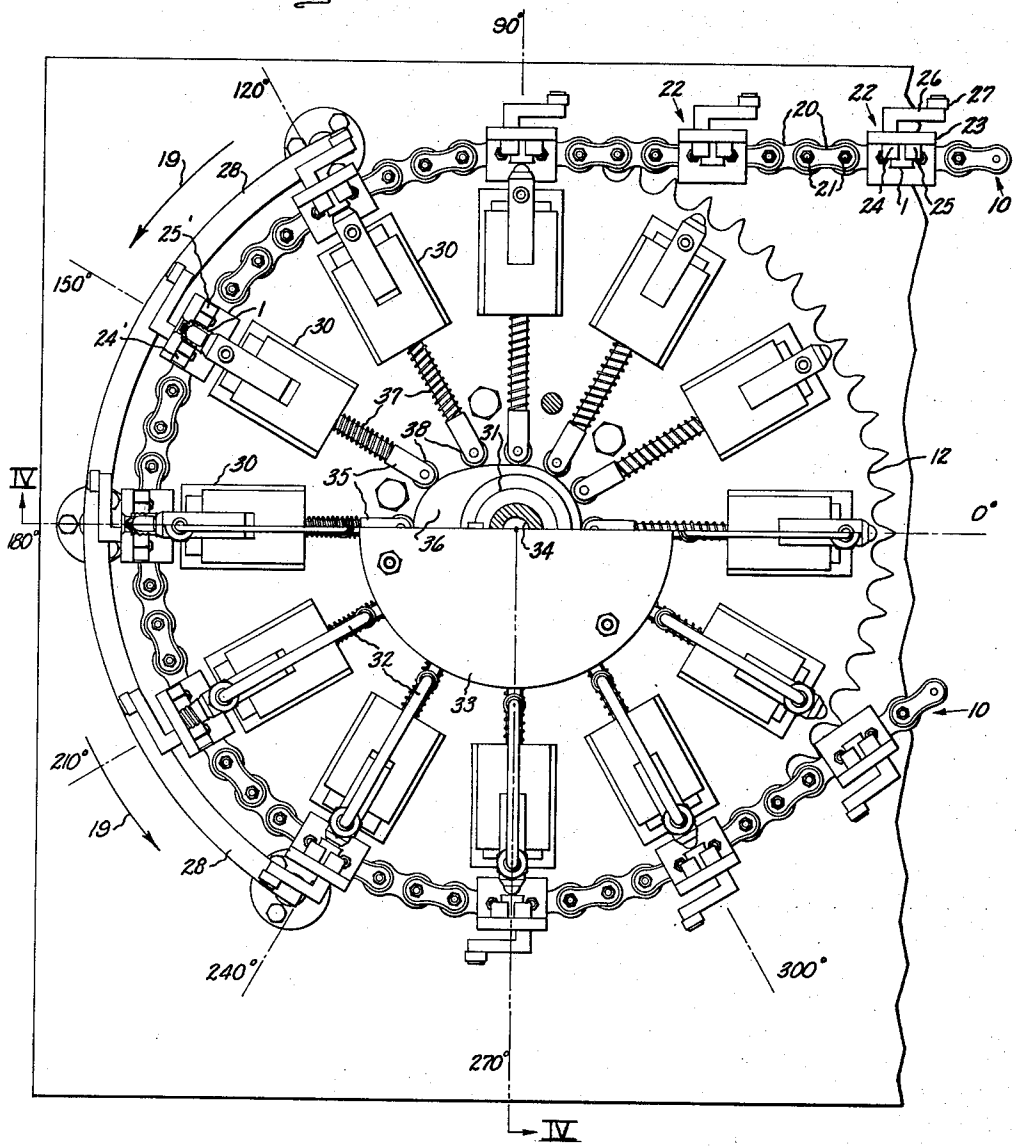
Fig. 3.



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NONINTERMITTENT LAMP BASE FILLING MACHINE

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Fig. 4.

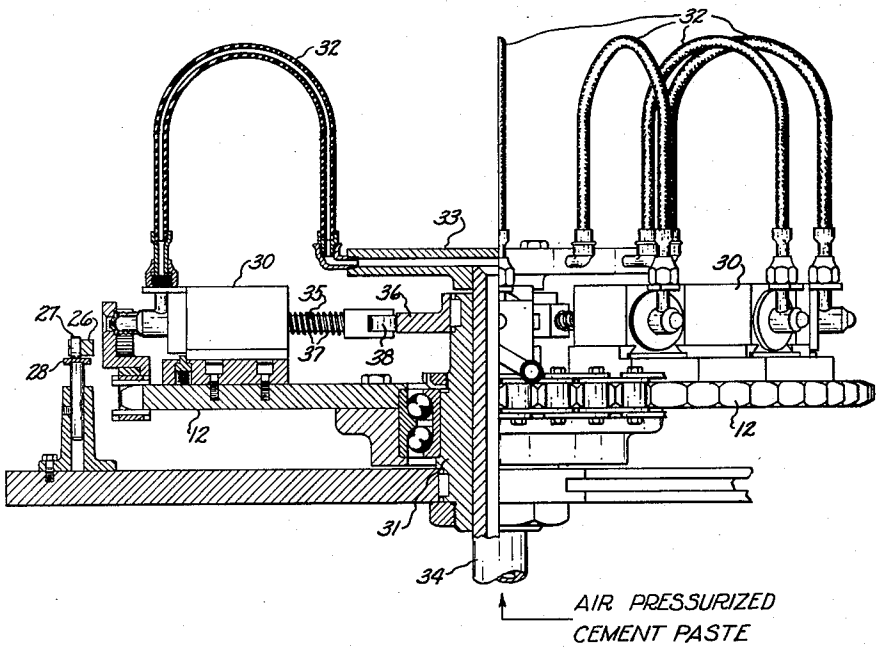
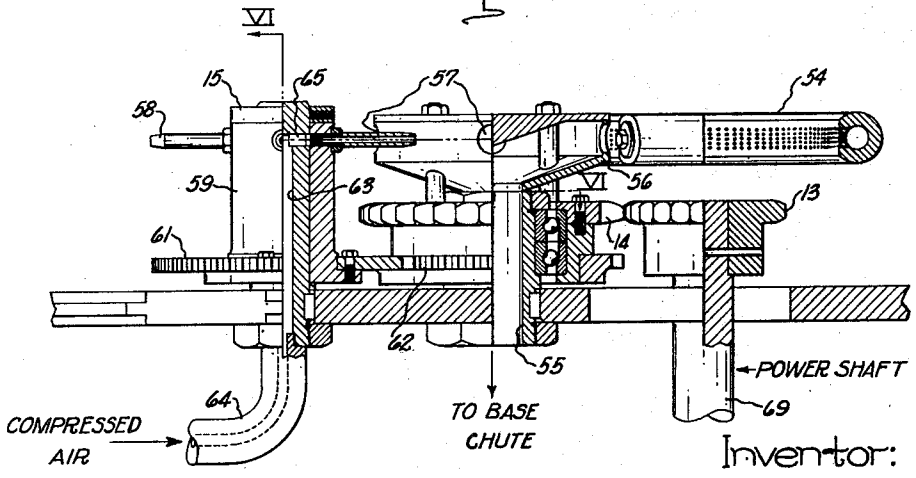


Fig. 7.



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NONINTERMITTENT LAMP BASE FILLING MACHINE

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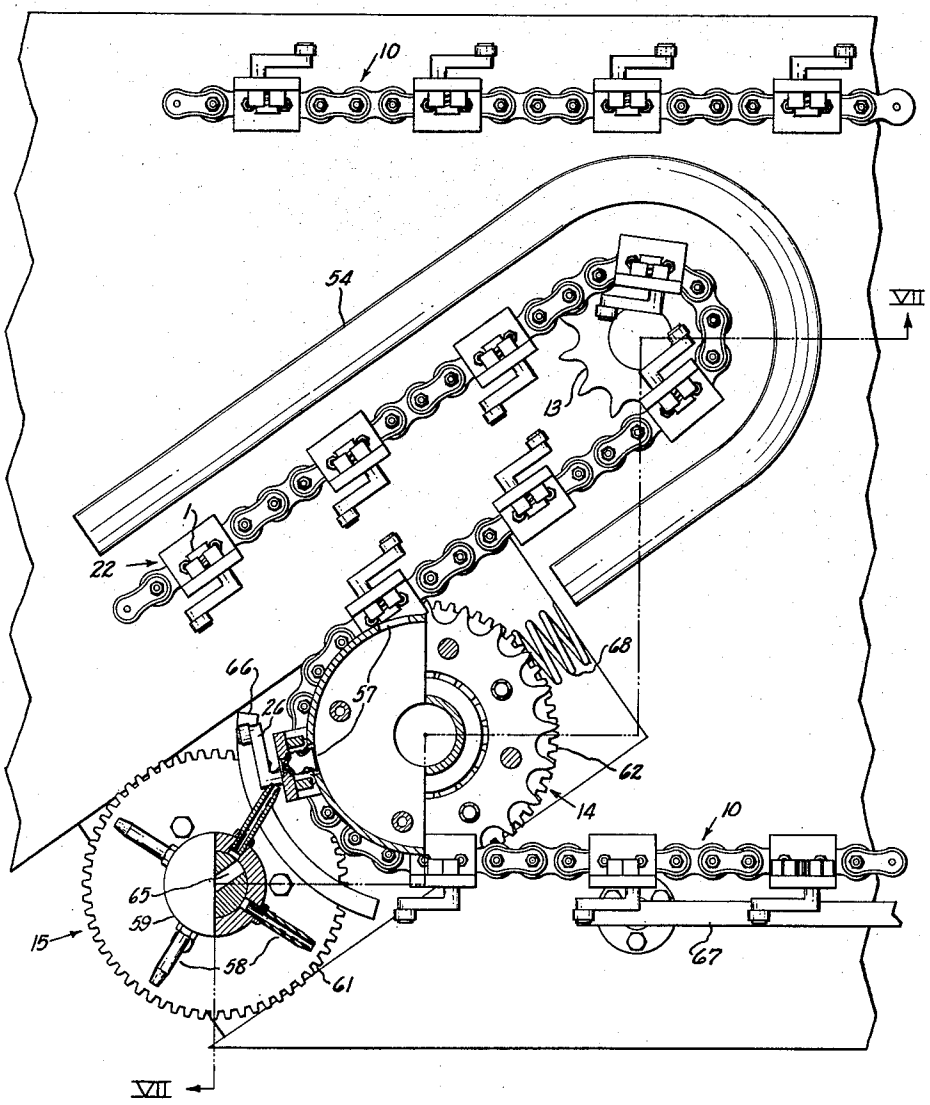
Fig. 6.



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Patented June 1, 1954

2,679,660

UNITED STATES PATENT OFFICE

2,679,660

NONINTERMITTENT LAMP BASE FILLING MACHINE

James Bain, Jr., Waldoboro, Maine, assignor to General Electric Company, a corporation of New York

Application December 22, 1950, Serial No. 202,351

10 Claims. (Cl. 18—5)

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This invention relates generally to lamp-making machinery and more particularly to equipment for applying a cement paste to the internal surface of a base in order that it may be secured to a bulb for constituting an electric lamp. Specifically, the invention is concerned with a machine applying the principles of nonintermittent or continuous action to the operation of filling a lamp base with cement, as contradistinguished from machines applying the principles of intermittent or indexing action.

Most of the lamp-making machinery which has been developed to date and in use at the present time is of the indexing type. With such machines, the manufacturing operations are performed upon the lamps at spaced work stations fixed in position, the lamp being advanced or indexed from one position to the next by means of suitable conveyor systems operating in a series of intermittent or discontinuous steps. Since the devices or mechanical operators which perform the desired operation on the lamp or product at each index station can operate only while the product is temporarily stopped and located in place, it necessarily follows that the operating speed of such indexing machinery is limited. Among these limiting factors are the power consumed and the tremendous stresses developed in continuously accelerating and decelerating the conveyor system in order to index the product or lamp to successive work stations. Moreover, the operator is effective only during the time while the product is located and stopped at a work station, and is inoperative during the intervals while the product is being moved from one station to the succeeding one. Lamp-making machinery of the indexing type is thus limited in output by the laws of mechanics; and, discounting incidental improvements, an increase in the production rate must generally be brought about by an increase in the number of machines in use.

The application of nonintermittent or continuous machinery to lamp making permits the avoidance of many of the mechanical limitations encountered with indexing machinery. Among the more important of the factors entering here and which will be considered more at length in this specification, might be mentioned the elimination of the stresses developed in indexing machinery due to the continuous stopping and starting, the reduction in the power consumed by the elimination of the continuous acceleration and deceleration of the conveyor system, and, last but not least, the remarkable increase in output which may be achieved by continuous utilization of the operators.

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Accordingly, the principal object of this invention is the provision of a machine applying the principles of continuous or nonintermittent action to the lamp-manufacturing operation of filling bases with cement.

Another object of the invention is the provision of an automatic lamp base filling machine of the nonintermittent type permitting a much more efficient utilization of mechanical operators by comparison with machines of the indexing type, and thereby achieving a much greater productive capacity.

Yet another object of the invention is the provision of a lamp base filling machine of the nonintermittent type having much lower power requirements than conventional machines of the indexing type.

Other objects of the invention are the provision of specialized equipment and apparatus which may be utilized in conjunction with nonintermittent machinery for effecting the operation of filling a lamp base with cement, as will appear more particularly hereinafter.

For further objects and advantages and for a better understanding of the invention, attention is now directed to the following description and accompanying drawings. The features of the invention believed to be novel will be more particularly pointed out in the appended claims. In the drawings:

Fig. 1 is a cross-sectional view of a miniature screw base for a lamp produced in large quantities by the lamp-making industry and for which high speed cementing, such as can be achieved by a nonintermittent type machine, is particularly desirable.

Fig. 2 is a simplified mechanical schematic diagram illustrating the over-all functioning of a roller chain and sprocket type nonintermittent base-filling machine embodying my invention.

Fig. 3 is a fragmentary plan view of the machine showing a major sprocket carrying filler operators, a contiguous portion of the chain and the apparatus immediately associated therewith.

Fig. 4 is a side elevational view of the portion of the machine illustrated in Fig. 3, part of the view being in vertical section along the line IV—IV.

Figs. 5*a*, *b*, *c*, *d*, and *e* are various views of a filler operator which may be used in my base-filling machine.

Fig. 6 is a fragmentary plan view of the machine showing the minor sprockets including the air ejector and chute sprocket, a contiguous portion of the chain, and the associated apparatus;

the view is sectionalized along the line VI—VI in Fig. 7.

Fig. 7 is a side elevational view of the portion of the machine illustrated in Fig. 6, part of the view being in vertical section along the line VII—VII.

In order to simplify the consideration of certain principles of nonintermittent machines which will be discussed, certain terms used in this application will be defined in the following manner:

Product.—The object that requires an operation performed upon it, the specific product in the case of a base-filling machine being the base itself.

Operator.—The mechanism performing an action or making an operation on a product to advance it along the path to the desired state of a finished product. The feeding, filling, and ejecting units which will be considered in this application are examples of operators.

Material.—That which is added to a product during an operation to convert it into the finished product. In the case of a lamp base filling machine, the cement paste would be defined as a material.

In order to facilitate an understanding of my invention, the description of my nonintermittent lamp base filling machine and of the principles considered in connection therewith, will be subdivided under various major headings as follows:

Basic requirements

The raw materials of the process involved in filling a lamp base with cement comprise a finished base and the cement paste. A base typical of those which my machine is designed to handle is illustrated at 1 in Fig. 1. This base, will be recognized by those skilled in the art as representative of a kind utilized in very large quantities in the lamp-making industry. It is of the miniature screw or Edison type and comprises a thin-walled threaded metal shell 2 which is commonly made of brass, but which may also be made of aluminum or other suitable metal. The shell is slightly flared at 3, corresponding to its inner end, in order to receive a glass bulb for constituting a finished lamp, and has an opening at its outer end which is closed by a web 4 of plastic insulating material such as glass or a thermosetting type of plastic. Mounted on a boss 5 at the outer end of the web is a contact eyelet 6 which provides one terminal of the lamp, the other terminal being provided by the base shell itself. The plastic web 4 has a hole or perforation through its center for passing a lead wire from the bulb therethrough and making connection to the contact eyelet 6. The cross-hatched area 7 represents cement paste which is annularly disposed within the periphery of the base shell. The purpose of this cement is to securely fix the glass bulb to the base in the finished product constituting an electric lamp.

The specific function of the nonintermittent lamp base filling machine considered in this application is to receive the bases, as illustrated in Fig. 1 less the cement, and to dispose an annular ring of cement within it as shown at 7 in the figure. It will be understood that each type of base has exact specifications for paste distribution and volume.

The process of inserting cement as a thin layer around the inside periphery of the base, as performed in accordance with the prior art, has generally involved the use of intermittent or indexing machinery. With such machinery, the insertion of the paste may be accomplished by means of a cam-actuated feed tube supplied with air pressurized cement. The insertion of cement is performed at a work station of an indexing machine and the base may be rotated while the cement is being injected. The bases are automatically fed into and ejected from suitable holding cups. A typical production rate for such prior art intermittent type machines is approximately 4,000 bases per hour. By comparison, a continuous nonintermittent action lamp base filling machine embodying my invention may have a production rate of up to 40,000 bases per hour.

In automatic machinery it is generally necessary to prevent relative motion between the operator and the product during the period of time required for the operation. Indexing machines solve this problem by stopping the product, performing the operation, and then indexing the product to another position for a succeeding operation. Nonintermittent action requires that the operator and the product move continuously with uninterrupted constant velocity and that during the time required for the performance of the operation, the relative velocity between the operator and the product be zero. This last proposition summarizes the basic requirement of nonintermittent manufacturing machinery.

It will be realized that there are many possible combinations of machines or mechanisms which will satisfy the basic requirement above. Thus, a pair of rotating discs at the point of common tangency satisfy the basic requirement for an infinitesimally short interval of time when the relative velocity of the discs is zero. Evidently, the requirement of practically instantaneous action of the operator on the product limits the practical value of such a mechanism.

A practical mechanism for satisfying the basic requirement above is the roller chain and sprocket mechanism, and it offers many possible arrangements. For instance, two separate roller chain and sprocket mechanisms may be employed, the operators being mounted on the chain of one, and the product mounted on the chain of the other. The operation of the operator on the product may then be performed during a period of time when the chains are arranged to move in parallelism. Such an arrangement, however, suffers from certain disadvantages such as misalignment due to sag of the chains, instability of the chains under the action of forces, unequal wear between the chains and the difficulty of insuring exact velocities at all times.

In accordance with my invention, I prefer to utilize another arrangement of the roller chain and sprocket which is made possible by the fact that the relative velocity between the sprocket and chain is zero during the period of wrap, that is, during the period when the chain is wrapped around and moving with the sprocket. Since during this period the chain is, to all intents and purposes, stationary with respect to the sprocket, the operator may be mounted on the sprocket and the product carried by the chain and the operation performed with positive alignment. The product on the chain is carried away from the sprocket after the period of wrap in order that it may be submitted to a further operation at a subsequent sprocket. The operator on the other hand, revolves with the sprocket in order to perform its operation on another product carried by the chain at a point rearwardly displaced from the product first considered. By increasing

the number of operators, it is possible to have several products in the process of completion, and, of course, the number of sprockets which may be employed for performing separate operations is limited only by practical considerations of the length of chain which it is feasible to employ.

Referring to Fig. 2, a preferred arrangement of a lamp base filling machine embodying my invention is illustrated in simplified mechanical schematic form. The mechanism comprises a roller chain 10 on which are mounted suitable holders for holding the product, that is, the lamp bases of a type such as is illustrated in Fig. 1. The chain is wrapped around and engages the teeth of a number of sprockets of which the major sprockets 11 and 12 are of a larger size. Sprocket 11 carries the operators which feed the bases to suitable holders mounted at spaced intervals on the chain 10, whereas sprocket 12 carries the operators which insert the cement or paste into the bases. The chain is arranged to be driven in such a manner that it moves directly from the base feeding sprocket 11 to the cement inserting or filling sprocket 12, as indicated by the arrows. After leaving the filling sprocket, the chain passes around a driving or power input sprocket 13, and then around a sprocket 14 which operates as a chute through which the lamps drop after being blown out of the holders by means of an air ejector sprocket 15.

Feeding

In order that the operators may perform their action upon the product, that is upon the lamp bases, it is necessary that they be continuously supplied to the holders carried by the chain 10. In the machine, the feeding operation must occur during the interval of time while the chain moves around the 180° through which it wraps the feeding sprocket 11. As will appear subsequently, the machine is designed to operate at such a rate that the major sprockets make one revolution per second and each carry 12 operators. Thus, the output of the machine is twelve cement-filled lamp bases per second or 720 per minute, which gives a total production of 43,200 bases per hour.

The feeding mechanism must thus supply twelve bases every second to the chain and align them in a definite pattern so that they may be properly received and held by the base holders. In a preferred feeding mechanism which is fully described in my copending application Serial No. 202,353, filed December 22, 1950, and assigned to the same assignee as the present application, the bases are supplied from an overhead hopper and dropped into a distributing cup which is mounted on the feeding sprocket 11. The distributing cup has twelve funnel shaped openings equi-angularly disposed around its lower periphery, and the bases fall through these openings into radial V-shaped slides which lead into metering units from whence the bases are injected into the holders carried by the chain. It will be realized of course that various other mechanisms may be utilized for feeding the bases to the holders, and that they might also be fed by the attendant personnel. Such being the case, the feeding mechanism will not be described in detail in the present application and reference may be had to the above-mentioned copending application for a description of a preferred mechanism ideally suited for the purpose.

Filling operation

The filling operation is the most important and critical one of any performed by the lamp base filling machine. Its operation is subject to the following factors and considerations:

1. The mechanism must insert a controlled amount of cement paste into a base with a positive action in order to assure the desired quality of the finished product.

2. The filling mechanism must not function if a base is not present in the holder to receive the paste.

3. The paste must be under control at all times in order to prevent it from escaping at undesired times.

4. The timing of the operation must be directly related to the speed of the chain and occur during the period of wrap of the chain around the filling sprocket.

The above mentioned features and characteristics are provided by the filling sprocket and associated apparatus which will now be described in detail with reference to Figs. 3 and 4.

Referring to Fig. 3, the roller chain 10 engages the major sprocket 12 and causes it to rotate in a counter-clockwise direction, as indicated by the arrows 19, at a rate of one revolution per second. The chain comprises a series of links 20 and rollers 21 which are pivotally joined together in a conventional fashion. Mounted on the chain 10, and disposed in such fashion that during the period of wrap of the chain around the sprocket they are spaced at 30° intervals, are the base holders 22. The holders comprise an L-shaped frame member 23, a pair of jaws 24 and 25 adapted to grip the base and a bell crank 26 for the purpose of operating the jaws. The frame member 23 is secured in suitable fashion to a pair of adjoining rollers in the chain and support the jaws in such fashion that they are capable of pivoting in a plane normal to the plane of the sprocket 12. The jaws are spring forced together and have respectively interlocking spur teeth along their lower portions which maintain them in alignment and cause them to close together in a symmetrical fashion. The structure of the base holders is more fully described in the previously mentioned copending application. The base 1 may be released from the jaws by operating the bell crank 26; and for that purpose, a roller 27 is mounted on the free end of the bell crank for engaging the cam track 28 during a portion of the period of wrap of the chain around the sprocket. The jaws may be seen in their open or operated state at 24′ and 25′ at the 150° position on the sprocket.

The chain is effectively wrapped around the sprocket from the position indicated at 90° on the drawing to the 300° position. During the interval of time consumed by any one particular base holder in revolving through this angular displacement, such base holder has an angular velocity identical to that of the sprocket so that it is to all intents and purposes fixed with respect to the sprocket.

The machine is designed to fill a base with cement during the period from 90° to 270°. The filling of any one particular base is performed by one of twelve filler units 30, which are mounted radially upon the filling sprocket 12 revolving about the stationary shaft 31, as may more readily be seen in Fig. 4. The filler units 30 will be more fully described shortly with reference to Fig. 5. The cement paste is supplied to the filler

units by means of flexible rubber tubes 32 which receive their supply of paste from a central revolving distributing head 33 mounted on top of the sprocket 12. The paste is stored below the table of the machine in stationary container (not shown in the drawing) and is forced upwards by means of air pressure through the concentric rotating tube 34 within the stationary shaft 31 into the distributing head 33. The filler units are thus at all times supplied with pressurized cement paste for filling the lamp bases. The amount of paste inserted by the head of a filler unit into a base is determined by the internal arrangement of the operating parts in the filler unit, which parts are put into operation by the radial movement of the push rods 35. The movement of the push rods is occasioned by a harmonic cam 36 mounted on the stationary shaft 31, the coil springs 37 causing the rollers 38 mounted on the inner ends of the push rods, to bear against the periphery of the cam.

Referring to Figs. 5 generally, Figs. 5*a* and 5*b* show the filler operator 30 in the recessed, or unextended position. Fig. 5*a* is a plan view of the operator partly in section, Fig. 5*b* is a vertical section, whereas Fig. 5*c* is an end elevation view. The unit comprises a housing 40 which is securely mounted on the sprocket, preferably by means of a tongue and groove arrangement 41 as can be seen more particularly in Fig. 5*c*. It will be understood that twelve such units are mounted at 30° intervals on the major sprocket 12, and that these units revolve with the sprocket.

The moving parts of the unit are actuated by means of the push rod 35 which is normally extended outwardly from the housing 40 by means of the helical spring 37. As previously mentioned, the roller 38 is adapted to bear on the harmonic cam 36 so as to impart a reciprocating motion to the push rod as the unit revolves with the sprocket. Slidably mounted within the housing 40, is an annular sleeve 42 which is also free to slide with respect to the rod 35. The sleeve 42 is prevented from rotating axially with respect to the housing 40 by means of a long vertical pin 43, which secures it to a tongue 44 running in a groove 45 in the upper surface of the housing as may be seen in Fig. 5*a*. The pin 43 passes through a slot 46 in the rod 35 so that the rod may move to the extent allowed by the slot without interfering with the position of the annular sleeve. The sleeve is forced outwardly to the right by means of a spring 47 compressed between its rear shoulder and the inside surface of the rear wall of the housing 40.

During the time intervals when the harmonic cam is not forcing the push rod 35 forward, that is, to the right in Fig. 5, the force exerted by the spring 37 tending to pull the push rod back, that is, to the left, is greater than the force exerted by the spring 47 on the annular sleeve 42. As a result, the unit in its rest position assumes the position shown, the push rod 35 is forced to the left to the limit of its travel by the spring 37, which limit is determined by the fact that the slot 46 is engaging the pin 43 at its right-hand extremity, and through the pin 43 has brought the annular sleeve back to the limit of its permissible travel.

The pressurized paste is supplied to the filler unit by means of the flexible rubber tube 32 fitting on the nipple 48. The nipple is screwed into the annular sleeve 42 and leads the paste into an annular recess provided between the shaft of a plunger 49 and the bore of the annular sleeve 42. This annular space may be seen at 50 and its size is determined by the distance between the forward end of the push rod and the rear side of the expanded front portion of the plunger. The plunger has a limited longitudinal movement with respect to the push rod 35 through the arrangement of the slot 51 in the plunger and the small pin 52 secured to the rod. When the rod 35 is fully withdrawn, that is, to the left in Figs. 5, the annular space 50 assumes its position of greatest extension. This results from the fact that the small pin 52 has reached the limit of its travel in the slot 51, the plunger 49 being prevented from moving back any further by its rear end striking the long pin 43.

For reasons which have already been explained, it is essential that the filler unit should not release any cement paste when an empty base holder is encountered. It will be realized that such an event may readily occur as a result of the failure of the feeding unit to supply a base at the proper instant to one of the holders. The operation of the filler unit when a base is absent from the holder is shown in Fig. 5*d*. The unit is illustrated at the full length of forward movement of the push rod 35, such corresponding to the 180° position of Fig. 3 in the absence of a base in the base holder. As the harmonic cam forces the rod 35 forward, that is, to the right in Fig. 5*d*, the long pin 43 is released and this permits spring 47 to force the anular sleeve 42 forward. However, the paste is not exposed because of the fact that the nose portion 53 of the annular sleeve is not held back by a base. Thus, the annular recess 50 is not uncovered and the paste remains confined within it.

Fig. 5*e* shows the operation of the filler unit when it encounters a holder containing a base 1. The push rod 35 is moved forward by the harmonic cam, and, in the same manner as before, the long pin 43 is released so that the annular sleeve 42 is now free to move forward under the action of the spring 47. The annular sleeve does move forward a slight distance until its nose portion 53 contacts the outer shoulder of the lamp base 1. When such occurs, the annular sleeve ceases to move whereas the push rod 35 continues to advance and pushes the plunger 49 forward until its forward face contacts the bottom of the base. At this point, the annular recess 50 is located inside the base and the continued movement of the rod 35 squeezes the paste out of the annular recess so that it assumes the disposition shown at 7 in Fig. 1 of the drawing. When the forward annular shoulder of the rod 35 has advanced to the point where it contacts the rearwardly facing shoulder of the expanded front portion of plunger 49, the paste is completely extruded from the annular recess and the recess is effectively eliminated. This state of affairs is reached at approximately the 180° position of the sprocket. Thereafter, the push rod 35 is retracted or, in other words, moves back to the left in Fig. 5, and the annular sleeve, along with the plunger, is retracted into the casing 40. The plunger 49 can only move back to the extent allowed when its rear end strikes the long pin 43. Thereafter, the rod 35 continues to move backward and opens up the annular recess 50 again. As the recess 50 reopens, the pressurized paste flows into it from the reservoir through the tubing 32, and the unit is then ready for the next filling operation.

Since it is practically impossible to secure a perfect alignment of the base in its holder with

respect to the filler unit by reason solely of the engagement of the chain in the sprocket, it is desirable that the base be released to a certain extent by the jaws 24 and 25 of the holder, and that the plunger 49 and the nose 53 of the sleeve 42 be permitted to determine the final position of the base during the injecting operation. This is achieved by means of the cam track 28 in Fig. 3, which, beginning at the 120° position of the sprocket, forces the bell crank 26 of the base holder upwards. This partly releases the base in the holder and allows the plunger 49 and the annular sleeve to determine the final alignment. This feature also permits compensation for dimensional tolerances and variations in the individual bases. At the 240° position, the cam track 28 ends and permits the bell crank 26 to drop down, whereupon the jaws once more securely grip the base while the chain moves it onwards to the succeeding sprockets.

A nonintermittent base-filling machine provided with twelve filler units such as have been described can rotate one revolution per second. At such a speed, the machine produces 720 bases per minute or 43,200 bases per hour. The complete paste inserting operation occurs during a 180° rotation of the main sprocket or, in other words, within 0.5 second. This compares very favorably as to insertion time with the prior art indexing type machines. For instance, one well-known machine of the indexing type produces 4,000 bases per hour, that is, one base every 0.9 second. The indexing time in that machine is 0.4 second and the remaining 0.5 second provides the time for insertion of the paste. It is thus seen that the nonintermittent machine embodying my invention provides the same amount of time for filling the bases as the prior art machine yet has an output eleven times greater. This is made possible by the nonintermittent motion and the increased number of filler units. In terms of indexing machinery, a production rate of 43,200 bases per hour seems an incredible amount to process. However, it is seen that by having recourse to nonintermittent machinery, such a rate is entirely feasible and does not entail a higher speed in the operators, that is, in the filler units.

Ejecting operation

After the base-filling operation is completed and the base holder has moved beyond the 300° position of the filling sprocket, the base may be ejected immediately from the holder. However, where the bases are not to be utilized immediately, it may be desirable to heat them in order to form a skin on the surface of the cement paste which will prevent the bases from sticking together in the containers where they are stored. The heating of the bases may be achieved by means of fire banks 54 disposed to direct jets of flame on the base while the chain carries it around the power input sprocket 13, as may be seen in Fig. 6.

With certain very fluid forms of paste, the effect of gravity in disturbing the peripherial distribution of the paste within the shell of the base may be appreciable. Where necessary, this effect may be corrected by so disposing the machine that the bases are held in a vertical plane, that is, with their axes vertical, after leaving the filling sprocket for a sufficient length of time to permit the paste to harden. Another expedient to which recourse may be had consists of providing means in conjunction with horizontal base holders for indexing the bases through a small angle periodically. For instance, this may be achieved by a ratchet mechanism to rotate the base in the jaws each time the jaws are partly opened and closed. Suitable cam devices may be provided along the path of the chain to operate the bell cranks of the base holders and thereby cause rotation of the jaws.

Mechanical means may be provided to eject the bases after the filling operation. However, due to the damage which may result from striking the bases in their heated condition after leaving the fire banks, it is preferable to utilize an air blast for ejecting them. Referring to Figs. 6 and 7, the ejecting unit comprises the chute sprocket 14 and the air ejector sprocket 15. The chute sprocket 14 is a free running sprocket driven by the roller chain. It is mounted on a hollow stationary shaft 55 which has an encased flared portion 56 at its upper end serving as a funnel for catching the bases. The bases are blown out of the jaws by the air blast and into the funnel portion 56 through the holes 57 in the side thereof. Thereafter, the bases fall through the hollow shaft 55 and into a suitable chute or receptacle.

The air ejector sprocket comprises four nozzles 58 which are mounted on a sleeve 59 fastened to a pinion 61 geared by a 1 to 1 ratio to a pinion 62 fastened to the chute sprocket 14. The air ejector sprocket 15 has a stationary central hollow shaft 63 to which air is supplied under pressure, as by means of the rubber hose 64. A slot 65 is milled in the shaft 63 in line with the axis of the chute sprocket 14 such that whenever a nozzle passes opposite it, air is admitted to the nozzle for blowing the base out of the holder. Just before arriving at the air blast position, the jaws of the base holder are opened and the base is released; this is achieved by means of a cam track 66 which forces the bell crank 26 of the lamp base holder upwards. When the base is blown out of the jaws, it falls through one of the holes 57 in the flared portion of chute sprocket 14 and down the hollow stationary shaft 55 into a suitable chute or container under the machine (not shown in the drawing).

If the air blast should fail to eject the base, the jaws will open wide after passing the ejection unit through the action of the cam track 67 and the base will fall out of the holding jaws before it reaches the feeding mechanism. It will be realized of course that suitable control means may be provided to stop the operation of the machine in case a base should stick in the jaws.

The ejection unit serves a secondary role as a means for automatically adjusting the tension of the roller chain. To this end, the air ejector and chute sprockets are mounted on a sliding unit under the action of a spring 68 which keeps the chain under constant tension and prevents it from sagging.

The power input sprocket 13 is mounted on a shaft 69 and serves to drive the chain and the other sprockets. The shaft 69 may be the output shaft of a gear reducer driven by a variable speed electric motor or any other suitable means.

While the invention has been described in considerable detail as to its component parts, it is to be understood that it is not intended to limit the invention to these particular details. A great many modifications in the component parts of the mechanism are possible in order to adapt it to perform different operations upon lamp bases and similar products, or to operate upon

bases having different configuration and requiring another disposition of cement paste. The machine is particularly adaptable to interchangeability of operator units, such as the filler units, for instance, of which different sizes may be used for different types of bases. The appended claims are therefore intended to cover any such modifications coming within the true spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A nonintermittent continuous action machine for inserting a material into a product, comprising a roller chain, product holders mounted on said chain, a sprocket engaging said chain over a predetermined angle of wrap, operators mounted on the periphery of said sprocket and having radially reciprocable plungers adapted to engage the product in cooperating holders over said angle and means actuated upon engagement of said plungers in said products for extruding said material into said products, and a fixed cam for actuating said plungers as said operators revolve with said sprocket through the angle of wrap.

2. A nonintermittent continuous action machine for inserting a material into a product comprising a roller chain, product holders mounted at spaced intervals on said chain, a sprocket engaging said chain over a predetermined angle of wrap thereby assuring zero relative motion between said sprocket and said chain over said angle, operators mounted at spaced intervals on the periphery of said sprocket corresponding to the intervals between said holders, each of said operators having a radially reciprocable plunger adapted to engage the product in a cooperating holder over said angle and means actuated upon engagement of said plunger in said product for injecting said material into said product, and a stationary cam fixed at the axis of said sprocket for actuating said plunger and causing the injection of said material into said products as they revolve with said sprocket through said angle of wrap.

3. A nonintermittent continuous action machine for inserting a material into a product, comprising a roller chain, a plurality of holders mounted at equal intervals on said chain for holding said products in fixed alignment, a sprocket engaging said chain over a predetermined angle of wrap and thereby assuring zero relative velocity between said products and said sprocket over said angle, operators mounted on the periphery of said sprocket at spaced intervals corresponding to those between said holders and assuring radial alignment of said operators with said products, each of said operators having a radially reciprocable plunger adapted to engage the product in a cooperating holder over said angle and means actuated upon engagement of said plunger in said product for extruding said material into said product, a central distributing head rotating with said sprocket and having tube connections to said operators for supplying them with said material, and a stationary cam fixed at the axis of said sprocket for actuating said plungers and causing the injection of said material into said products.

4. A nonintermittent continuous action machine for inserting a cement paste into a lamp base, comprising a roller chain, base holders mounted on said chain, a sprocket engaging said chain over a predetermined angle of wrap, operators mounted on the periphery of said sprocket and having radially reciprocable plungers adapted to engage the bases in cooperating holders over said angle and means operating upon engagement of said plungers in said bases to extrude said paste into said bases, and a fixed cam for actuating said plungers as said operators revolve with said sprocket through the angle of wrap.

5. A nonintermittent continuous action machine for inserting cement paste into a lamp base, comprising a roller chain, base holders mounted at spaced intervals on said chain, a sprocket engaging said chain over a predetermined angle of wrap thereby assuring zero relative motion between said sprocket and said chain over said angle, operators mounted at spaced intervals on the periphery of said sprocket corresponding to the intervals between said holders, each of said operators having a radially reciprocable plunger adapted to engage the base in a holder cooperating in position therewith over said angle and means operating upon engagement of said plunger in said base to extrude said paste into said base, and a stationary cam fixed at the axis of said sprocket for actuating said plungers and causing the injection of said paste into said bases as they revolve on said chain through said angle of wrap.

6. A nonintermittent continuous action machine for filling a lamp base with a cement paste, comprising a roller chain, a plurality of base holders mounted at equally spaced intervals on said chain, a sprocket engaging said chain over a predetermined angle of wrap wherein the relative velocity between them is zero, a plurality of filler units peripherally located at equal intervals on said sprocket, said filler units being disposed in such fashion as to permit cooperation with successive ones of said base holders during the period of wrap of said chain around said sprocket, each of said filler units comprising a reciprocable plunger adapted to move radially outwards for engaging a base in a cooperating holder and means operating upon engagement of said plunger in said base to extrude said paste into said base, means for continuously feeding pressurized cement paste to said filler units, and a stationary cam fixed at the axis of said sprocket for actuating said plungers.

7. A nonintermittent continuous action machine for filling a lamp base with a cement paste, comprising a roller chain, a plurality of base holders mounted at equally spaced intervals on said chain, a sprocket engaging said chain over a predetermined angle of wrap wherein the relative velocity between them is zero, a plurality of filler units peripherally located at equal intervals on said sprocket, said filler units being disposed in such fashion as to permit cooperation with successive ones of said base holders during the period of wrap of said chain around said sprocket, each of said filler units comprising a push rod adapted to move radially outwards, an annular sleeve surrounding said push rod, a plunger forward of said push rod and normally defining therewith an annular recess within said sleeve for holding cement, and means operating upon engagement of said plunger in said base to extrude cement from said recess into said base, a central rotating distributing head on said sprocket having tube connections to said filler units for feeding pressurized cement to them, and a stationary cam fixed at the axis of said sprocket for actuating said plungers over said angle of wrap.

8. A nonintermittent continuous action machine for inserting a peripherally disposed ring of cement paste within the interior of a lamp base, comprising an endless roller chain having a plurality of base holders secured thereto at equally spaced intervals, a sprocket engaging said chain for obtaining zero relative motion therewith over an angle of wrap, a plurality of filler units mounted on said sprocket at angular intervals corresponding to the spacing of said base holders during said angle of wrap, each of said filler units comprising a plunger adapted to advance radially outwards from said unit in order to enter a base in a cooperating holder, an inwardly spring-biased push rod defining, with a reduced portion of said plunger, an annular recess for holding cement paste, a spring-biased annular sleeve normally surrounding said reduced portion and closing said recess to prevent extrusion of cement therefrom, a stationary cam axially disposed with respect to said sprocket for actuating said push rods during said angle of wrap in order to extrude cement from said recesses into the bases held in cooperating holders, and means for continually supplying pressurized cement paste to said filler units.

9. A nonintermittent continuous action machine for inserting a peripherally disposed ring of cement paste within the interior of a lamp base, comprising an endless roller chain having a plurality of base holders secured thereto at equally spaced intervals, a sprocket engaging said chain for obtaining zero relative motion therewith over an angle of wrap, a plurality of filler units mounted on said sprocket at angular intervals corresponding to the spacing of said base holders during said angle of wrap, each of said filler units comprising a plunger adapted to advance radially outwards from said unit in order to enter a base in a cooperating holder, an inwardly spring-biased push rod defining, with a reduced portion of said plunger, an annular recess for holding cement paste, a spring-biased annular sleeve normally surrounding said reduced portion and closing said recess to prevent extrusion of cement therefrom, said annular sleeve being adapted to be restrained by a base in a cooperating holder upon a forward reciprocation of said push rod, thereby to open said recess and allow extrusion of cement paste therefrom into the base, a stationary cam, axially disposed with respect to said sprocket, for actuating said push rods in a forward reciprocation during said angle of wrap, and a central rotating distributing head on said sprocket having tube connections to said filler units for supplying pressurized cement paste to them.

10. A nonintermittent continuous action machine for filling a lamp base with a cement paste, comprising a roller chain, a plurality of base holders mounted at equally spaced intervals on said chain, a sprocket engaging said chain over a predetermined angle of wrap wherein the relative velocity between them is zero, a plurality of filler units peripherally located at equal intervals on said sprocket, said filler units being disposed in such fashion as to permit cooperation with successive ones of said base holders during the period of wrap of said chain around said sprocket, each of said filler units comprising a push rod adapted to move radially outwards, an annular sleeve surrounding said push rod, a plunger forward of said push rod and normally defining therewith an annular recess within said sleeve for holding cement, and means operating upon engagement of said plunger in said base to extrude cement from said recess into said base, a central rotating distributing head on said sprocket having tube connections to said filler units for feeding pressurized cement to them, a stationary cam fixed at the axis of said sprocket for actuating said plungers over said angle of wrap, and means for ejecting said bases from said holders, comprising an air jet cooperating with a sprocket mounted on a hollow shaft serving as a chute for said bases.

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