Nov. 20, 1951 P. O. CARTUN 2,575,746

SEALING-IN MACHINE FOR TUBULAR DOUBLE-ENDED LAMPS

Filed Jan. 11, 1947 2 SHEETS—SHEET 1

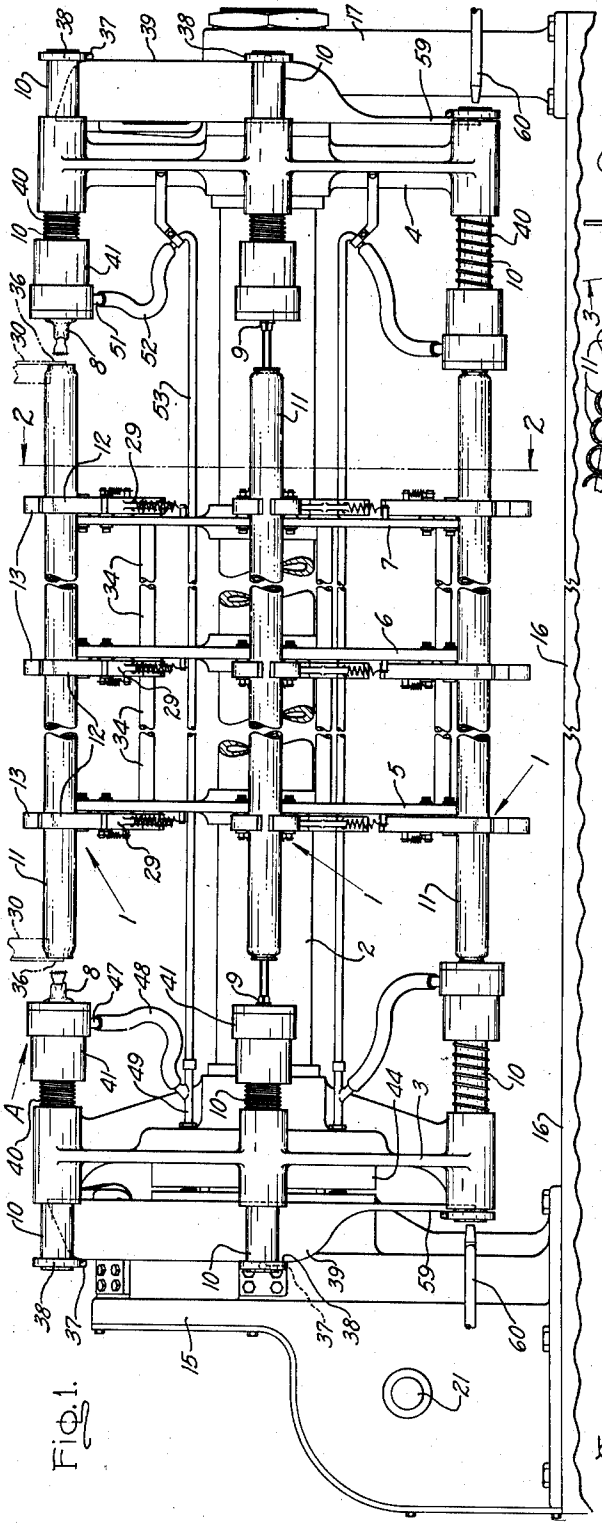


Fig. 1.

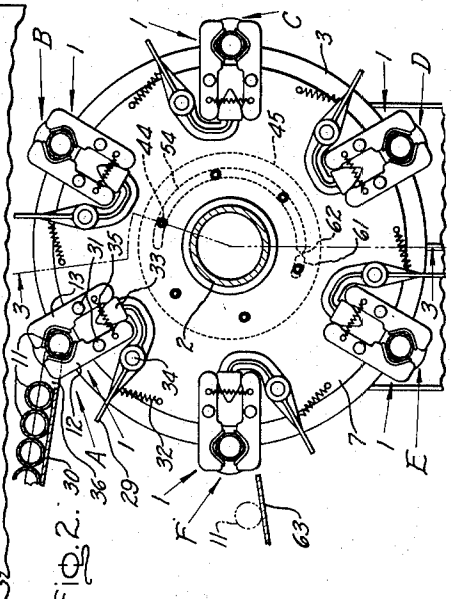


Fig. 2.

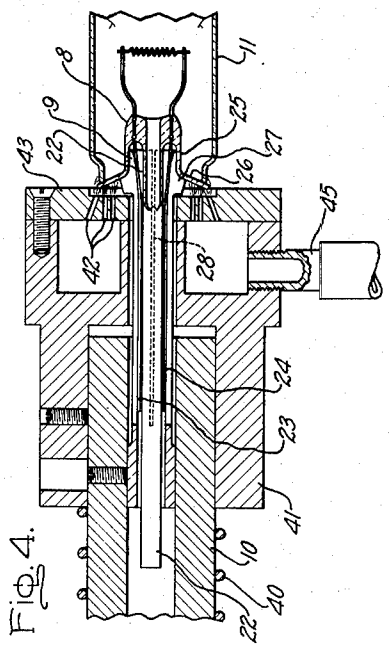


Fig. 4.

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Fig. 3.

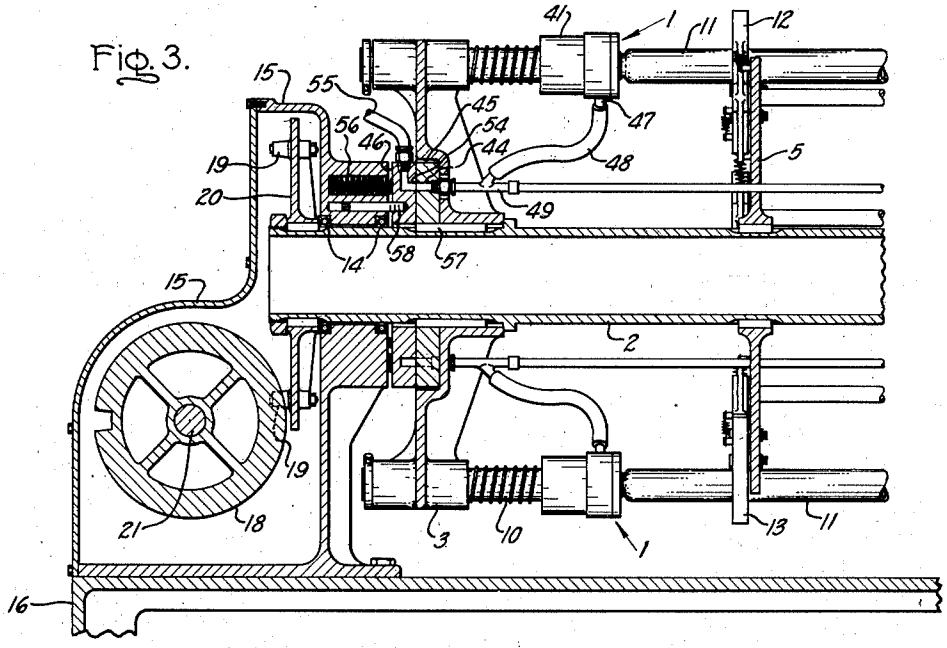
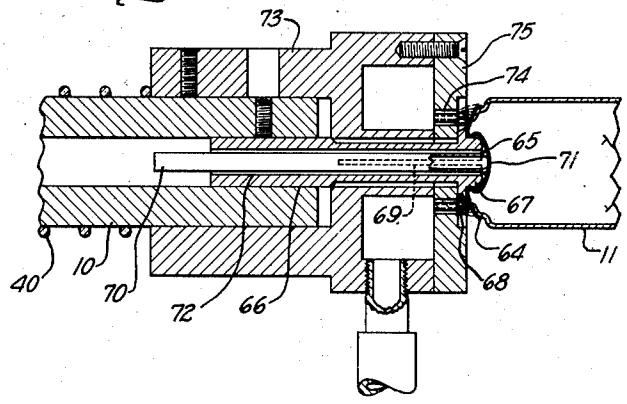


Fig. 5.



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UNITED STATES PATENT OFFICE

2,575,746

SEALING-IN MACHINE FOR TUBULAR DOUBLE-ENDED LAMPS

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Application January 11, 1947, Serial No. 721,529

14 Claims. (Cl. 49—2)

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My invention relates to apparatus for sealing electric incandescent and discharge lamps and similar devices. More particularly my invention relates to apparatus for sealing a vitreous or metal terminal element or closure member to the ends of a tubular envelope, and still more particularly my invention relates to apparatus for simultaneously sealing terminal or closure elements to opposite ends of a relatively long tubular envelope. The terminal element in such a combination completes the enclosure formed by the envelope and provides a means of making the electrical connections to other elements confined within the envelope.

One object of my invention is to provide apparatus for gripping and holding the closure elements and the tubular envelope of electrical devices in sealing relation and for fusing said elements and said envelope together. The use of sealing apparatus having such a construction facilitates the assembly and handling of the various parts of the electrical devices and assures proper and uniform sealing of the closure elements and envelope in commercial manufacturing practice.

Another object of my invention is to provide apparatus for simultaneously sealing closure elements to opposite ends of a tubular vitreous envelope and thereby materially reduce the handling of the closure elements and the envelope. Heretofore considerable difficulty, breakage and expense has resulted in that the closure elements were sealed to opposite ends of the tubular envelope in separate operations between which said envelope was removed, turned end-for-end and then reinserted in the sealing apparatus. Inasmuch as many of such envelopes are very long, 96 inches in some instances, the difficulty and time consuming factor of manipulating the envelopes comprises an important factor in the cost of the sealing operation. The difficulty of manipulating the long envelopes is increased by the presence of the heated seal, and by the care required to prevent breakage of the fragile exhaust tube at the end of the envelope.

Another object of my invention is to provide apparatus for simultaneously sealing closure elements to opposite ends of a tubular envelope disposed in a horizontal position, and associated apparatus to materially increase the convenience, speed and satisfactory performance of the sealing operation. The generally satisfactory performance of the sealing operation in commercial manufacture requires that the seals be made properly and, in addition, that the handling of

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parts be kept to a minimum and that the entire operation be readily performable.

Still other objects and advantages of my invention will appear from the following detailed description of species thereof and from the drawing.

In the drawing, Fig. 1 is a side elevation of one species of sealing apparatus comprising my invention; Fig. 2 is a vertical section through the apparatus along line 2—2 of Fig. 1 in the direction indicated; Fig. 3 is a longitudinal section through the head end of the apparatus along line 3—3 of Fig. 2 in the direction indicated; Fig. 4 is a longitudinal section through the holder, the burner and the adjacent portion of the head at one end of the apparatus with a closure element and end portion of an envelope in sealing relation thereto; and Fig. 5 is a section corresponding to Fig. 4 of a modification of my apparatus holding a modified closure element and envelope end.

As shown in Figs. 1, 2 and 3 my apparatus comprises six heads 1 spaced about the horizontal shaft 2 with their component parts mounted on the turrets 3 and 4 at opposite ends thereof and on the spiders 5, 6 and 7 located therebetween. Each head 1 comprises a series (three) of pairs of jaws 12, 13 and a pair of holders 9, 9, and is adapted to hold a closure element in the form of a glass stem type electrode mount 8 on each of the holders 9, 9 on the hollow spindles 10 carried by the turrets 3 and 4 and to support in alignment therebetween a relatively long tubular envelope 11 held by corresponding pairs of jaws 12 and 13 on the spiders 5, 6 and 7. Clockwise, (Fig. 2) indexing movements of the shaft 2 which is supported at the head end by the ball bearings 14—14 in the head stock 15 carried by the bed 16 and at the tail end by corresponding bearings (not shown) in the tail stock 17 carried by said bed 16 advance all parts of the heads 1, in turn, to successive work stations. Movement of the shaft 2 is controlled through the engagement of a barrel cam 18 with one or more of the rollers 19 on the spider 20 on the head end of said shaft 2. The cam 18 is rotated by the main drive shaft 21 and is grooved to advance a roller 19 and accordingly the heads 1 during a portion of its rotation. A portion of the cam 18 of uniform shape separates two of the rollers 19 and holds the heads 1 at definite locations during the remainder of the rotation of the cam. Means (not shown) such as an electric motor and speed reducer are preferably provided for turning the main drive

shaft 21 to actuate the entire apparatus at a uniform rate.

The apparatus is preferably operated with the assistance of two operators who take positions adjacent the head and tail stocks 15 and 17, respectively, at the near side (Fig. 1) of the apparatus, and who introduce the electrode mounts 8 and envelope 11 into the heads 1 at station A which is the initial station taken in the cycle of operation. Each operator places the electrode mount 8 on the holder 9 (Fig. 4) by threading the end of the exhaust tube 22 and the extending ends of the leading in wires 23 and 24 through the central opening in said holder 9 and then moving said electrode mount 8 so that the cavity formed by the stem tube 25 passes over the head of the holder and the flanged portion 26 of the stem tube 25 abuts against the flange 27 at the rear of the said head of holder 9. The head and adjacent portion of the holder 9 are divided into four resilient finger portions by slits, such as that shown at 28, at 90 degree intervals, to constitute a sort of collet chuck in which the said fingers are compressed by the inner walls of the cavity in the stem tube 25 so that they tend to expand and thereby engage said tube 25 with sufficient pressure and friction to hold the electrode mount 8 securely in place.

After feeding the electrode mounts 8—8 into the head 1, the operators cooperate in effecting the opening of the three pairs of jaws 12 and 13 thereof on the spiders 5, 6 and 7 by pressing against one of the three coupled control levers 29 of the actuating means of any of the said pairs of jaws 12 and 13 and then releasing the end-most envelope 11 of the supply thereof carried on the rails 30—30 so that said envelope rolls down said rails 30—30 and into the pairs of jaws 12 and 13. Thereafter, the pressure against the control lever 29 is released and the jaws 12 and 13 which are pivoted on pins 31—31 on the spiders 5, 6 and 7 are closed on the envelope 11 by the movement effected in each control lever 29 by the contraction force of springs 32 extending between said levers 29 and posts in the spiders 5, 6 and 7. The jaws 12 and 13 of each pair are influenced by the movement of a wedge 33 on the end of a control lever 29 into position between the ends thereof and close equally so that the envelope 11 is held in proper alignment with the holders 9 and the electrode mounts 8—8. The three control levers 29 of each head 1 are coupled together through a rod 34 to which they are fastened and which is carried by bearings in the spiders 5, 6 and 7 and, accordingly, they actuate all three pairs of jaws 12, 13 of each head 1 upon manipulation of any one of the levers. The contracting force of the springs 35 which extend between a post in each of the jaws 12 and 13 influence said jaws 12 and 13 so that they take positions determined by the positions of the wedges 33. The envelope 11 is positioned longitudinally within the head 1 by the extending end portions 36—36 of the sides of the rails 30—30.

The operations of the apparatus relating directly to the sealing functions thereof begin with the indexing movement of the head 1 to station B and are initiated by movements of both holders 9 toward the spiders 5, 6 and 7 so that the electrode mounts 8 are carried into the open ends of the envelope 11 and the rim portions of the flanges 26 of the stem tubes 25 therefore seated tightly against the rims of the open ends of the envelope 11. The movements of the holders 9 are caused by passage of the rollers 37 on the collars 38 on the opposite ends of the spindles 10 therefrom onto the inclined surfaces of the stationary cams 39 and then beyond said cams 39, which passage allows the expansion force of springs 40 located about portions of the spindles 10 between turrets 3 and 4 and the burners 41 on the spindles to move said spindles 10 and holders 9 as described. Each holder 9 is at such times under the constant resilient influence of the expansion force of the spring 40 which force keeps the engaged surfaces (Fig. 4) of the electrode mounts 8 and the envelope 11 in intimate contact.

Another operation occurs during the indexing movement of the head 1 to station B, the operation being the admission of combustible gas to the ring shaped burners 41 thereof so that flames are directed from the rings of openings 42 in the cover plate 43 of said burners 41 against the flanges 26 of the stem tubes 25 and to a limited extent against the rim of the envelope 11. Each burner 41 (Fig. 3) at the head end of the apparatus receives gas from a rotary valve through a connection made to a separate opening 44 in the face of the rotating section 45 thereof, which is in engagement with the stationary section 46 thereof, through the pipe nipple 47, flexible hose 48 and pipe branch-connection 49. Corresponding burners 41 (Fig. 1) at the opposite end of the apparatus receive gas through pipe nipples 51, flexible hoses 52, pipes 53 and the branch-connections 49 and are therefore operated in combination with the other burners 41 of the heads 1. The gas connection terminates in the opening 44 in the rotary valve while the head 1 is located at station A as the opposite face of the stationary section 46 over which said opening 44 is located is solid. However, the index of the head 1 to station B causes a corresponding movement to the rotating section 45 of said valve which carries said opening 44 over the arcuate passage 54 (Figs. 2 and 3) in said stationary section 46 which passage 54 is connected to a main gas supply source through pipe 55. Pilot burners (not shown) located along the path of movement of the burners 41 cause the gas discharged thereby to be ignited. Proper contact between the moving and stationary sections 45 and 46 of the rotary valve is assured by the pressure of the expansion force of springs 56 located in wells in the head stock 15 behind the stationary section 46 whereas proper rotation and fixation of the moving and stationary sections 45 and 46 is caused by the key 57 which connects said moving section 45 to shaft 2 and the stud 58 which extends from said stationary section 46 to a confining opening in the head stock 15.

When the head 1 takes station B, the outer edges of the flanges 26 of the stem tubes 25 of the electrode mounts 8—8, at both ends thereof and the adjacent rim portions of the envelope 11 are being heated by the burners 41—41 and moderate pressure is being applied against each stem tube 25—25 through each holder 9 to keep the flanges in intimate contact with the ends of the envelope 11. Any irregularity of the mating surfaces cannot cause a longitudinal displacement of the envelope 11 since it is held securely by the jaws 12 and 13 on the spiders 5, 6 and 7.

The heating operation continues during the further indexing movement of the head 1 which takes the electrode mounts 8—8 and envelope 11 through stations C, D and E, in turn, and gradually fuses and seals the stem flanges 26—26 to said envelope 11. In the course of the indexing

movements, the gradual softening of the stem flanges 26—26 and the adjacent portions of the envelope 11 allows the pressure of engagement of the holders 9—9 to produce movement in said holders 9—9 and the electrode mounts 8—8 causing the working of the full periphery of the sealed area into satisfactory condition obviating all minor irregularities in these parts. The movement of the holders 9—9 occurs prior to the advance of the head 1 into station E and reaches its limit when the collars 38—38 on the opposite ends of the spindles 10—10 seat against the turrets 3 and 4. In the advance of the head 1 to station E, the holders 9—9 are drawn back in a direction away from the envelope 11 short distances by the passage of the rollers 37—37 on collars 38—38 onto the portions 59—59 of cams 39—39 and a jet of air is directed up through the hollow interior of spindles 10—10 and the open end of the exhaust tubes 22—22 to the interior of the envelope 11 by the stationary pipes 60, 60. The combined pull of the holders 9, 9, through their frictional engagement with the stem tubes 25—25, and the pressure of the air within the envelope 11 causes the stem tubes 25 to be displaced as they remain seated on the holders 9—9 while the flanges 26 and seals of the now completely assembled lamp are worked to slightly different shape. This working operation and the annealing action of the fires from the burners 41—41 which are of reduced intensity at station E retard the cooling and relieve the strains within the seals and the adjacent portion of the lamp so that very strong and satisfactory seals result. The reduced strength of the flames from the burners 41—41 results from movement of the passage 44 in the moving section 45 of the rotary valve over a portion 61 (Fig. 2) of the arcuate passage 54 in the stationary section 46 of the valve which is separated from the main portion by the restriction 62 so that flow of gas to said burners 41—41 is materially reduced.

The indexing movement of the head 1 from station E to F turns the moving section 45 of the rotary valve so that the passage 44 connected to burners 41—41 is carried beyond the end of the arcuate passage 54 to a solid portion of the stationary valve section 46 and the supply of gas is disconnected from the passage 44 causing the sealing fires to be extinguished. The indexing movement also carries the rollers 37—37 on the collars 38—38 onto the highest parts of the cams 39—39 causing the spindles 10—10 and holders 9—9 to move in a direction away from the lamp so that said holders 9—9 are separated therefrom. The sealed portions of the lamp are sufficiently cool at such times so as not to be deformed by the pull of the holders 9—9.

At station F, the last station taken by the head 1 in one cycle of operation of the apparatus, the pairs of jaws 12 and 13 on spiders 5, 6 and 7 are opened by the operators so as to effect the release of the lamp and said lamp is shifted longitudinally and laterally so as to be separated and removed from the apparatus. The operators press against one of the control levers 29 to release the lamp, and then slide said lamp endwise to remove the exhaust tube 22 at one end thereof completely from the associated holder 9, and then shift it in the opposite direction to separate the exhaust tube 22 at the opposite end from the other holder 9. The removed lamp is rested on the sloping surface of the table 63 and rolls therealong to the next manufacturing operation (not shown).

In certain instances differently formed electrode mounts, one of which is not provided with an exhaust tube, are sealed to opposite ends of the envelope 11. In such instances, the pipe 60 at one end of the apparatus is dispensed with but otherwise the sealing operation is the same as described above.

In still other instances, where closure members in the form of metal discs 64, such as that shown in Fig. 5, are to be sealed over opposite ends of the tubular envelope 11, use is made of a modified head having differently shaped holders and burners better suited to hold and heat said metal discs. The metal disc 64 as shown at one end of the lamp in Fig. 5 has a rounded cavity or indented portion 65 at the center and is mounted on the holder 66 by being slipped over the head 67 thereof to the extent permitted by the flange 68. In this particular instance the head 67 and adjacent portion of the holder 66 is slit as at 69 into three fingers which are resiliently compressible to engage the circular disc 64 with sufficient friction to hold it in place. The disc 64 is provided with an exhaust tube 70 fused thereto around an opening 71 at the center of the cavity in the disc and extending into the passage 72 of the holder 66. The burner 73 differs from that previously described in the location of the discharge openings 74 in the cover plate 75 thereof, which openings 74 are arranged to direct flames against the disc 64. The pressure of engagement of the disc 64 with the end of the envelope 11 in the normal operation of the apparatus assures positive engagement and sufficient heat exchange between the disc 64 and envelope 11 to effect the fusion of the latter and making of the seal shown in Fig. 5.

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

1. Apparatus for sealing closure elements, each having a cavity at the center thereof, to opposite ends of a tubular envelope comprising spaced turrets rotatable on a common axis, a spider located therebetween and rotatable on the same axis, a plurality of heads at spaced intervals about the axis of rotation each comprising a movable holder mounted on each turret and having a resiliently compressible end portion for supporting and gripping a closure element through frictional engagement with the walls of the cavity in said closure element and means mounted on the spider for supporting the tubular envelope between and in alignment with the holders, means in engagement with the turrets and the spider for causing the corresponding rotation thereof about the common axis to advance the heads to a plurality of stations in turn, means engaging the holders for moving said holders toward and away from each other at separate stations to bring the closure elements in proper sealing relation to the ends of the tubular envelope and to thereafter separate said holders from the closure elements, and heating means located in operative relation to the holders for fusing together the closure elements and the ends of the tubular envelope at other stations.

2. Apparatus for sealing closure elements, each having a cavity at the center thereof, to opposite ends of a tubular envelope comprising a horizontally disposed rotatable shaft, spaced turrets mounted on the shaft, a spider mounted on the shaft between said turrets, a plurality of heads

at spaced intervals about the shaft each comprising a movable holder mounted on each turret and having a resiliently compressible end portion for supporting and gripping a closure element through frictional engagement with the walls of the cavity in said closure element and means mounted on the spider for supporting the tubular envelope in alignment with the holders, support means engaging the opposite ends of the shaft, means engaging the shaft for causing the rotation thereof to advance the heads to a plurality of stations in turn, means in engagement with the holders for moving said holders toward and away from each other at separate stations to bring the closure elements in proper sealing relation to the ends of the tubular envelope and to thereafter separate said holders from the closure elements, and heating means located in operative relation to the holders for fusing together the closure elements and the ends of the tubular envelope at other stations.

3. Apparatus for sealing closure elements, each having a cavity at the center thereof, to opposite ends of a tubular envelope comprising spaced turrets rotatable on a common axis, a spider located between said turrets and rotatable on the same axis, a plurality of heads at spaced intervals about the axis of rotation each comprising a longitudinally movable spindle supported by each turret, a holder mounted on each spindle having a resiliently compressible end portion for supporting and gripping a closure element through frictional engagement with the walls of the cavity in said closure element, and means mounted on the spider for supporting the tubular envelope between and in alignment with the spindles, means in engagement with the turrets and the spider for causing the corresponding rotation thereof about the common axis to advance the heads to a plurality of stations in turn, means in engagement with the spindles for moving said spindles toward and away from each other to bring the closure elements into engagement with the proper sealing relation to the ends of the tubular envelope and to thereafter separate the holders from said closure elements, and burners mounted on the spindles adapted to direct heating flames against the closure elements for fusing together said closure elements and the tubular envelope.

4. Apparatus for sealing closure elements, each having a cavity at the center thereof, to opposite ends of a tubular envelope comprising spaced turrets rotatable on a common axis, a spider located between said turrets and rotatable on the same axis, a plurality of heads at spaced intervals about the axis of rotation each comprising a longitudinally movable spindle supported by each turret, a holder mounted on each spindle having a resiliently compressible end portion for supporting and gripping a closure element through frictional engagement with the walls of the cavity in said closure element, means mounted on the spider for supporting the tubular envelope between and in alignment with the spindles, and resilient means in engagement with the spindles tending to move the holders toward each other, means in engagement with the turrets and the spider for causing the corresponding rotation thereof about the common axis to advance the heads to a plurality of stations in turn, means located along the course of movement of the heads for withdrawing the spindles away from each other to permit the placing of closure elements onto the holders and insertion of a tubular envelope therebetween in the support means therefor and for thereafter releasing said spindles to permit the resilient means to move them so that the closure elements are advanced into engagement and proper sealing relation to the ends of the tubular envelope, and heating means in operative relation to the holders for fusing together the closure elements and the ends of the tubular envelope.

5. Apparatus for sealing closure elements, each having a cavity at the center thereof, to opposite ends of a tubular envelope comprising a head for supporting the closure elements and the tubular envelope in sealing relation, said head comprising spaced spindles movable toward and away from each other, holders mounted on the spindles having a plurality of compressible spring fingers for supporting and gripping the closure elements through frictional engagement with the walls of the cavities therein and having outwardly protruding means on at least one of the spring fingers of each holder abutted by said closure elements for positioning the said closure elements thereon, means between and in alignment with the spindles for supporting a tubular envelope with the ends adjacent the holders, burners mounted on the spindles adapted to direct heating flames against the closure elements for fusing together said closure elements and the ends of the tubular envelope, and expansion springs surrounding portions of the spindles for moving the spindles toward each other and the closure elements into engagement and proper sealing relation to the ends of the tubular envelope, a carrier for advancing the head to a plurality of stations comprising a horizontally disposed rotatable shaft, spaced turrets mounted on the shaft for supporting the spindles of the head, a spider mounted on the shaft between said turrets for holding the envelope-supporting means, means engaging the shaft for causing the rotation thereof to advance the head, a rotary valve mounted for actuation by the shaft to supply the burners with combustible gas during a portion of the rotation of said shaft during which the head is located at a station, and means engaging the spindles at other stations for moving the spindles farther away from each other to allow the closure elements and the envelope to be inserted and, after the sealing operation, to allow the removal thereof.

6. Apparatus for sealing closure elements, each having a cavity at the center thereof, to opposite ends of a tubular envelope comprising; a head including spaced and aligned spindles, resilient holders movably mounted in said spindles for supporting the closure elements by engagement with the walls of the cavities therein, an interposed tube supporting means for supporting said tubular envelope in alignment with said holders, and heating means associated with each holder; a movable turret for supporting the said head, and stationary cam means in the path of movement of said spindles for moving said holders toward and away from said tube supporting means to carry the closure elements into sealing relation to the ends of the tubular envelope and to thereafter separate said holders from the closure elements.

7. Apparatus for sealing closure elements to opposite ends of a tubular envelope comprising; a head including spaced and aligned spindles, holders movably mounted in said spindles for supporting the closure elements, an interposed tube supporting means for supporting said tubu-

lar envelope in alignment with said holders, and heating means associated with each holder; a movable turret for supporting the said head, and stationary cam means in the path of movement of said spindles for moving said holders toward and away from said tube supporting means to carry the closure elements in sealing relation to the ends of the tubular envelope and to thereafter separate said holders from the closure elements.

8. Apparatus for sealing closure elements to opposite ends of a tubular envelope comprising; a head including spaced and aligned spindles, holders movably mounted in said spindles for supporting the closure elements, an interposed tube supporting means for supporting said tubular envelope in alignment with said holders, and heating means associated with each holder; a movable turret for supporting the said head; stationary cam means in the path of movement of said spindles for moving said holders toward and away from said tube supporting means to carry the closure elements into sealing relation to the ends of the tubular envelope and to thereafter separate said holders from the closure elements; and means for introducing compressed air into the said envelope concomitantly with the movement of said holders away from said tube supporting means.

9. Apparatus for sealing closure elements to the opposite ends of a tubular envelope comprising support means for holding the tubular envelope, spaced opposed movable holders located on opposite sides of and in alignment with said support means for gripping respective closure elements and holding them in alignment with said envelope opposite the respective ends thereof, means mounting the holders for movement toward and away from said envelope support means, actuating means coacting with said holders to normally hold them in retracted position with the closure elements spaced from the ends of said envelope and to subsequently advance said holders toward each other to bring the closure elements into juxtaposition with and proper sealing relation to the ends of said envelope and, after sealing of the closure elements to the envelope, to separate said holders from the closure elements and withdraw said holders to their retracted position, and heating means associated with each holder for heating and fusing together the closure elements and the ends of the envelope.

10. Apparatus for sealing closure elements to the opposite ends of a tubular envelope comprising support means for tightly holding the tubular envelope against longitudinal movement therein, spaced opposed movable holders located on opposite sides of and in alignment with said support means for gripping respective closure elements and holding them in alignment with said envelope opposite the respective ends thereof, means mounting the holders for movement toward and away from said envelope support means, actuating means coacting with said holders to normally hold them in retracted position with the closure elements spaced from the ends of said envelope and to subsequently advance said holders toward each other to bring the closure elements into juxtaposition with and proper sealing relation to the ends of said envelope, and heating means associated with each holder for heating and fusing together the closure elements and the ends of the envelope, said actuating means being further adapted to advance the holders and associated closure elements a further amount toward each other from their initial sealing position upon softening of the closure elements and the envelope ends and, after sealing of the closure elements to the envelope, to separate the holders from the closure elements and withdraw said holders to their retracted position.

11. Apparatus for sealing closure elements to the opposite ends of a tubular envelope comprising support means for tightly holding the tubular envelope against longitudinal movement therein, spaced opposed movable holders located on opposite sides of and in alignment with said support means for gripping respective closure elements and holding them in alignment with said envelope opposite the respective ends thereof, means mounting the holders for movement toward and away from said envelope support means, separate interconnected actuating means for each of said holders and coacting therewith to normally hold them in retracted position with the closure elements spaced from the ends of said envelope and to subsequently advance said holders simultaneously toward each other to bring the closure elements into juxtaposition with and proper sealing relation to the ends of said envelope, and heating means associated with each holder for heating and fusing together the closure elements and the ends of the envelope, said actuating means being further adapted to advance the holders and closure elements a further amount toward each other from their initial sealing position upon softening of the closure elements and the envelope ends and, after sealing of the closure elements to the envelope, to simultaneously separate the holders from the closure elements and withdraw said holders to their retracted position.

12. Apparatus for sealing closure elements to the opposite ends of a tubular envelope comprising support means for tightly holding the tubular envelope against longitudinal movement therein, spaced opposed movable holders located on opposite sides of and in alignment with said support means for gripping respective closure elements and holding them in alignment with said envelope opposite the respective ends thereof, means mounting the holders for movement toward and away from said envelope support means, resilient actuating means coacting with said holders to normally hold them in retracted position with the closure elements spaced from the ends of said envelope and to subsequently advance said holders toward each other to yieldably press the closure elements against the ends of said envelope and move them longitudinally inward of said envelope upon heating and softening of the closure elements in the envelope ends, and heating means associated with each holder for heating and fusing together the closure elements and the ends of said envelope, said actuating means being further adapted to separate the holders from the closure elements after sealing of the latter to the envelope and to withdraw said holders to their retracted position.

13. Apparatus for sealing closure elements, each having a cavity at the center thereof, to opposite ends of a tubular envelope comprising support means for holding the tubular envelope, spaced opposed movable holders located on opposite sides of and in alignment with said support means and each having a plurality of compressible spring fingers for supporting and gripping respective closure elements through fric-

tional engagement with the walls of the cavity therein and holding them in alignment with said envelope opposite the respective ends thereof, means mounting the holders for movement toward and away from said envelope support means, actuating means coacting with said holders to normally hold them in retracted position with the closure elements spaced from the ends of said envelope and to subsequently advance said holders toward each other to bring the closure elements into juxtaposition with and proper sealing relation to the ends of said envelope and to thereafter pull and disengage the spring fingers of said holders from the closure elements and return the said holders to their normal retracted position, and heating means associated with each holder for heating and fusing together the closure elements and the ends of the envelope.

14. Apparatus for sealing closure elements, each having a cavity at the center thereof, to opposite ends of a tubular envelope comprising support means for holding the tubular envelope, spaced opposed movable holders located on opposite sides of and in alignment with said support means and each having a resiliently compressible end portion for supporting and gripping respective closure elements through frictional engagement with the walls of the cavities therein and holding them in sealing relation to the

opposite ends of the envelope, heating means in operative relation to said holders for fusing together the closure elements and the tubular envelope, means for introducing compressed air in the tubular envelope, and means operable concomitantly with the last-named means for moving the holders oppositely away from each other in a direction longitudinally of the envelope to cause the seal to change shape and be worked.

PAUL O. CARTUN.

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Certificate of Correction

Patent No. 2,575,746 November 20, 1951

PAUL O. CARTUN

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows:

Column 7, line 44, for "the proper" read *and proper*;

and that the said Letters Patent should be read as corrected above, so that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 1st day of April, A. D. 1952.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.