July 14, 1925.

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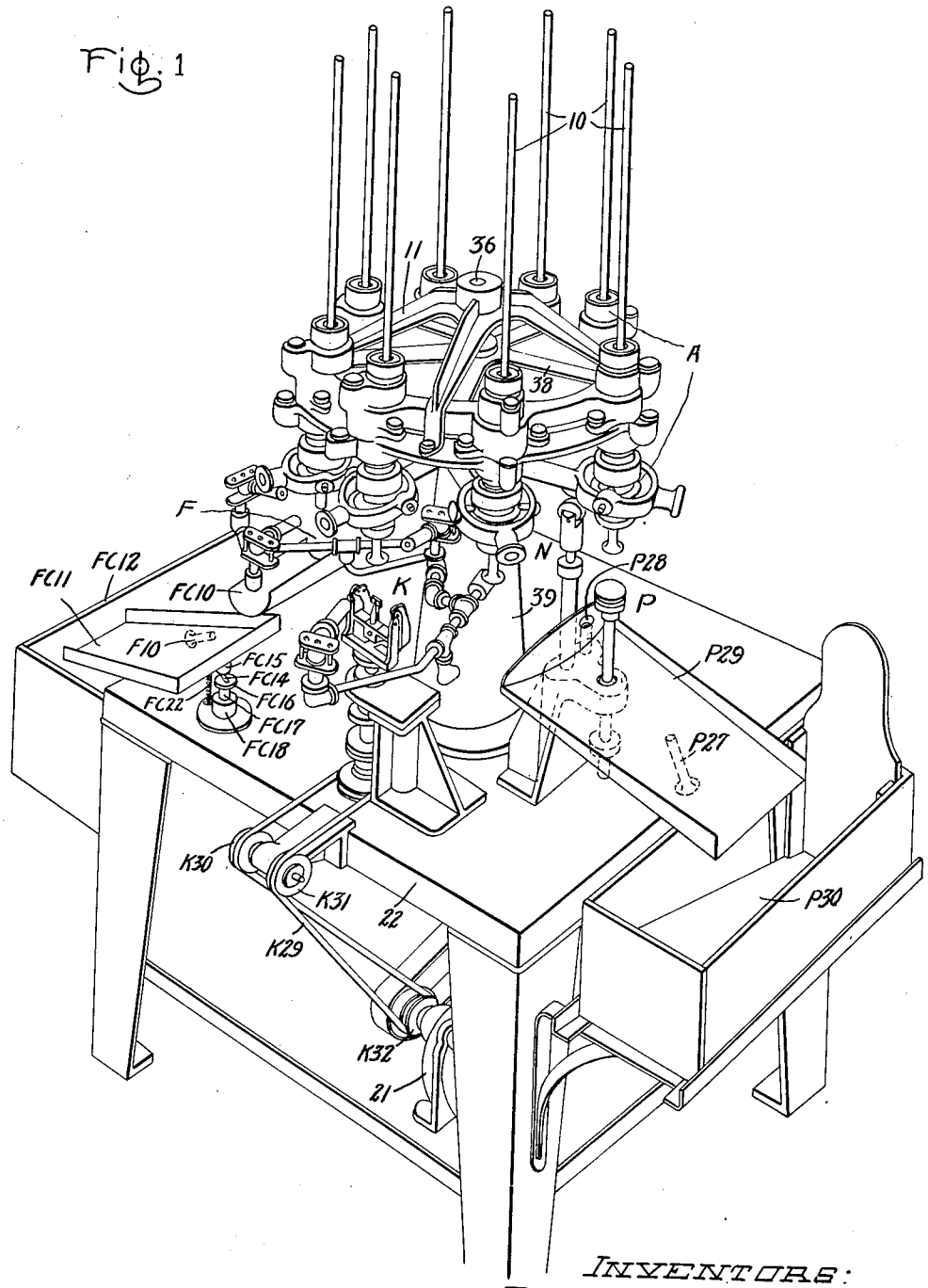
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AUTOMATIC FLARE MACHINE

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7 Sheets-Sheet 1

Fig. 1



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Fig. 23.

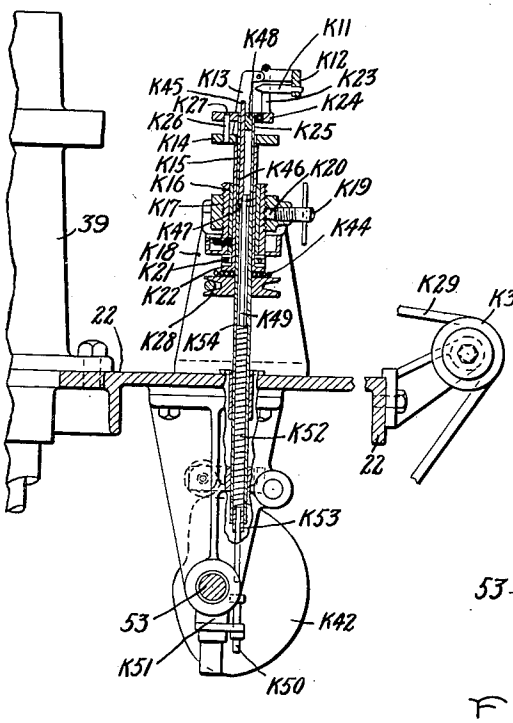


Fig. 24.

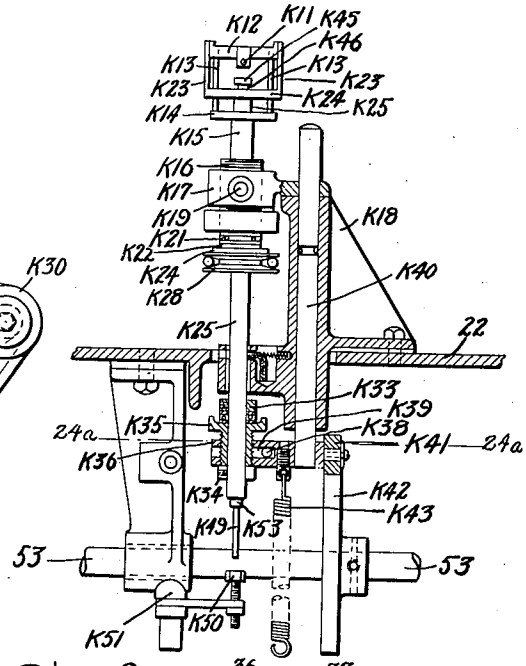


Fig. 2.

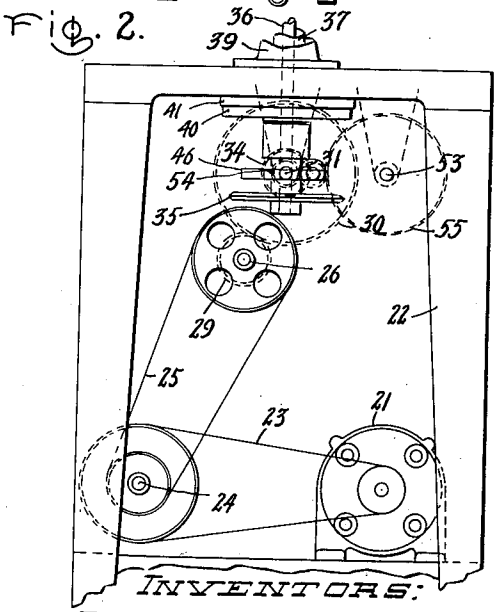


Fig. 25.

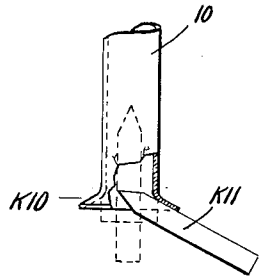
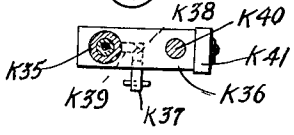


Fig. 24a



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Fig. 3.

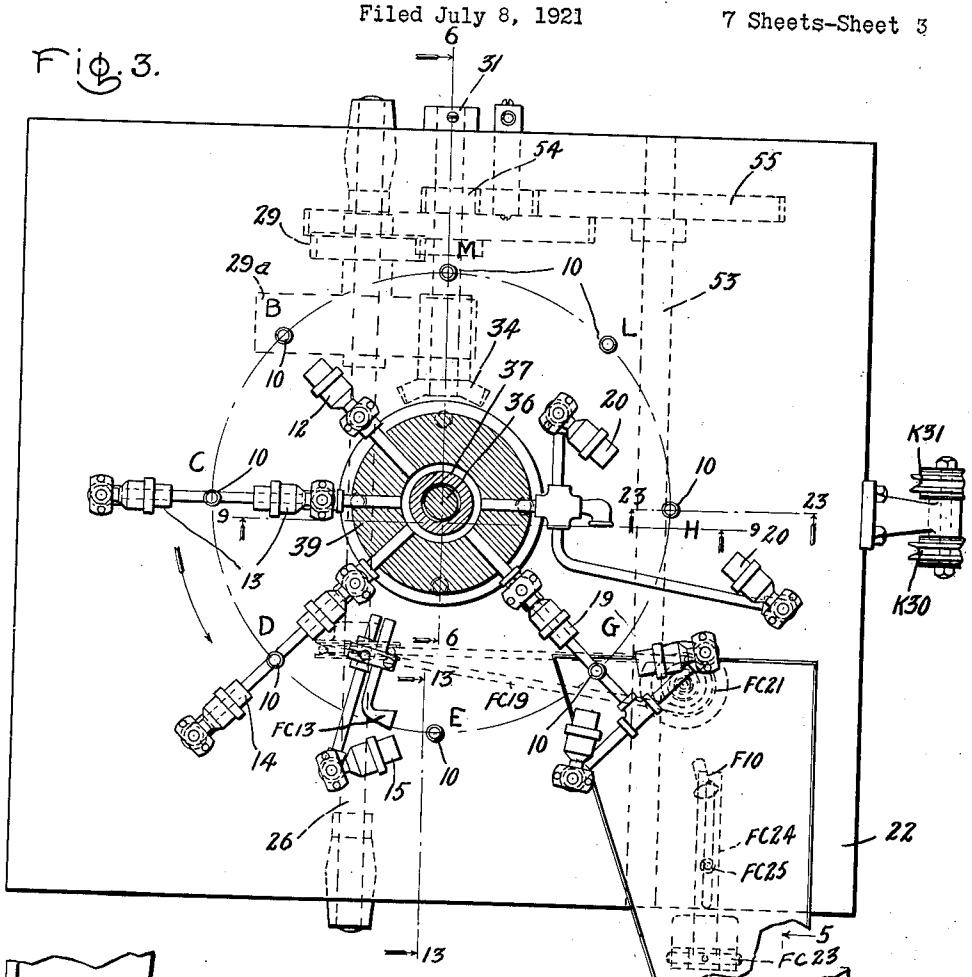


Fig. 4.

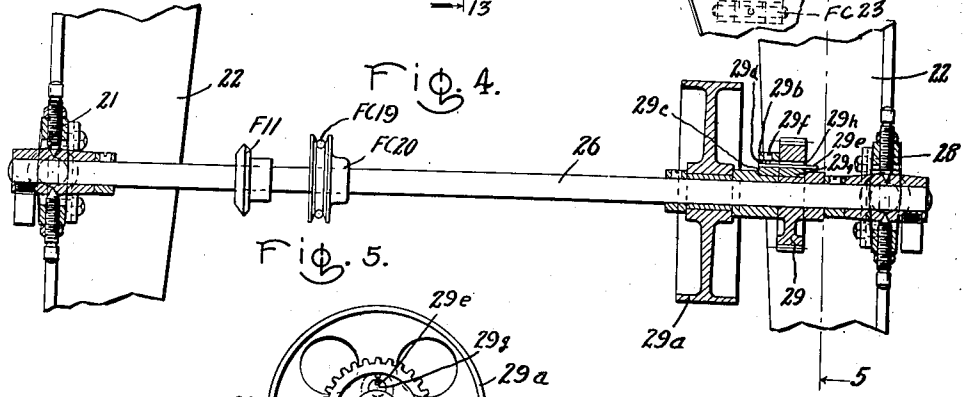
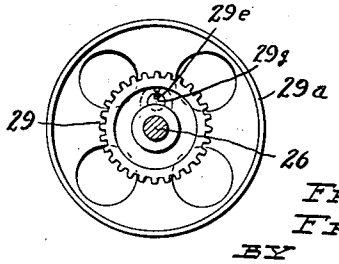


Fig. 5.



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Fig. 7.

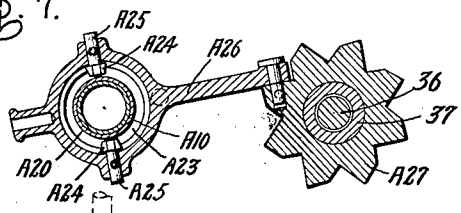


Fig. 6.

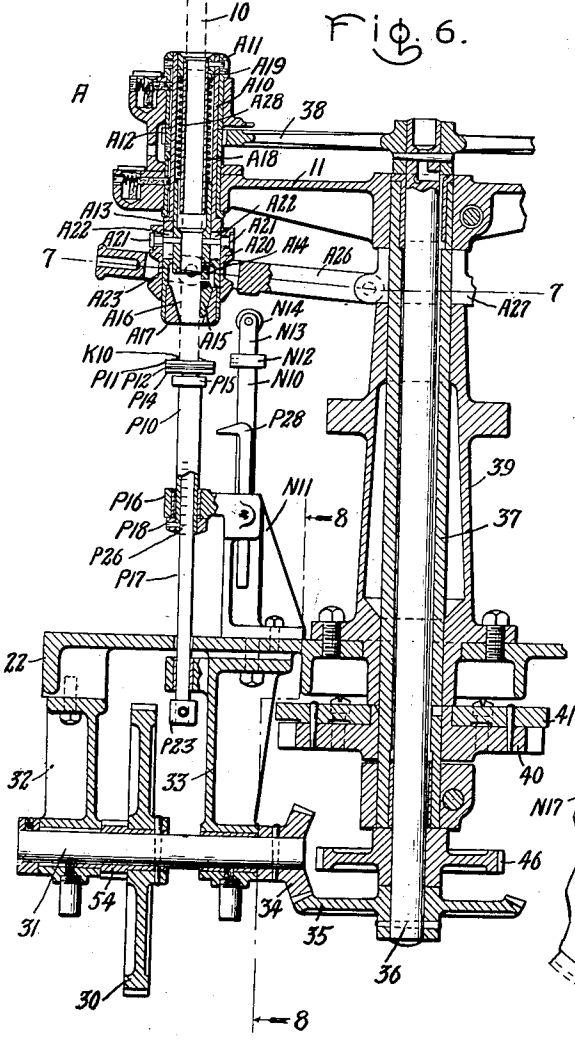
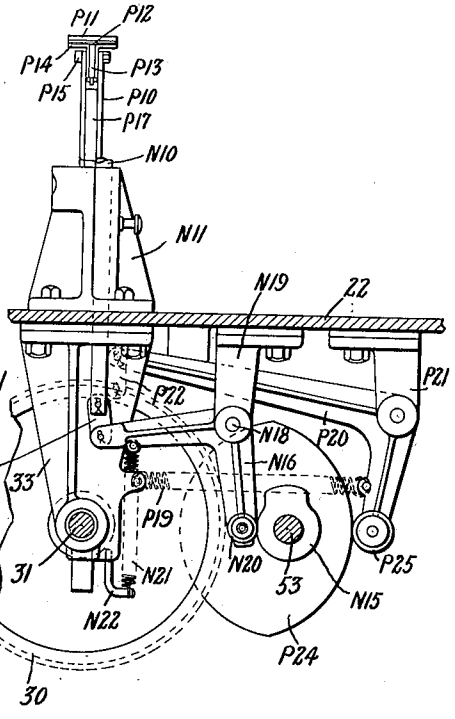


Fig. 8.



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Fig. 12.

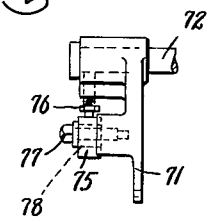


Fig. 11.

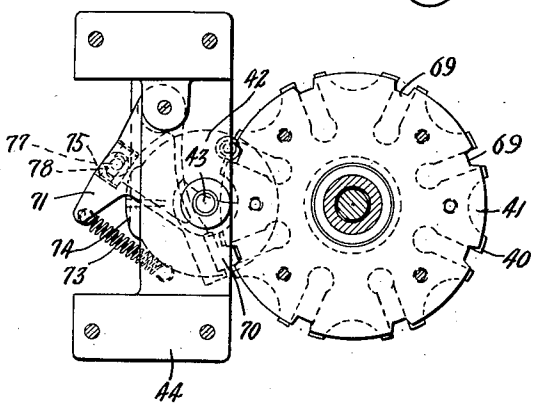


Fig. 10.

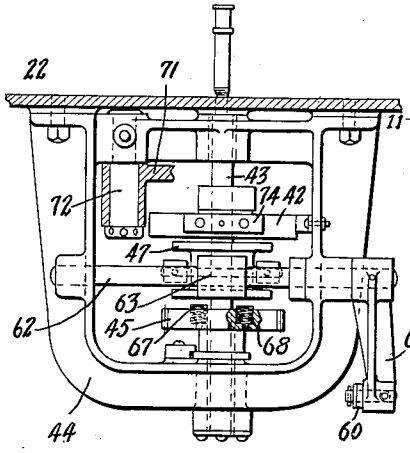


Fig. 9.

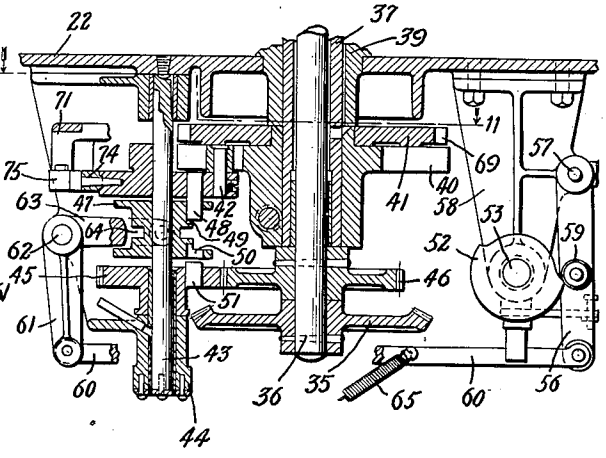
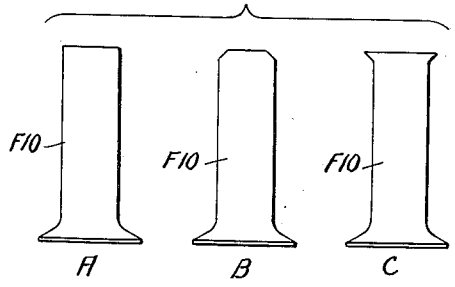


Fig. 26.



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Fig. 20

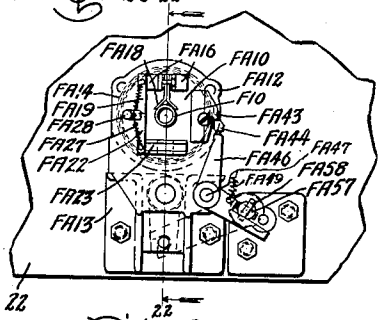


Fig. 21

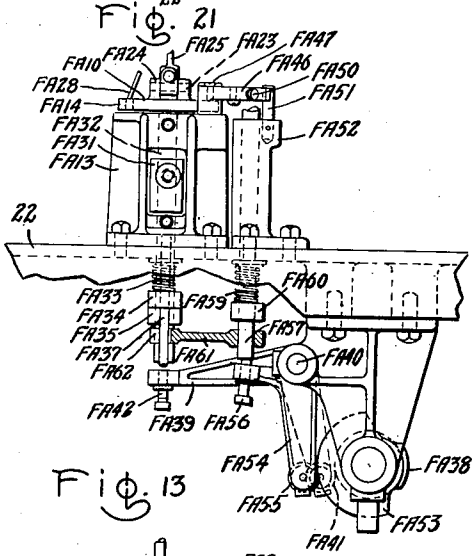


Fig. 13

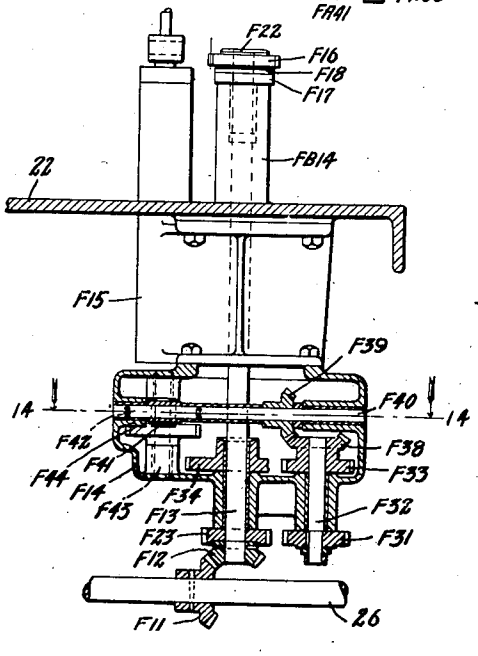


Fig. 22

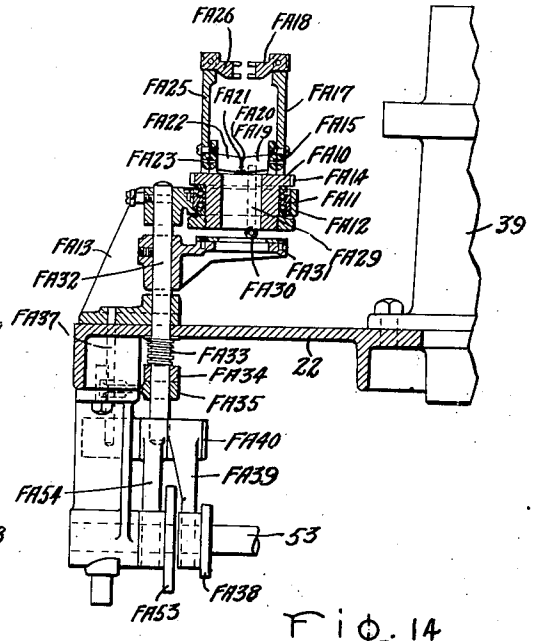


Fig. 14

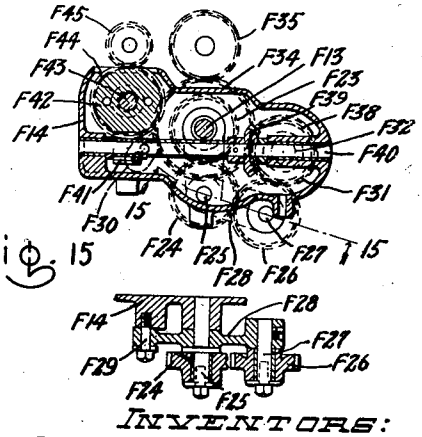


Fig. 15

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Fig. 16

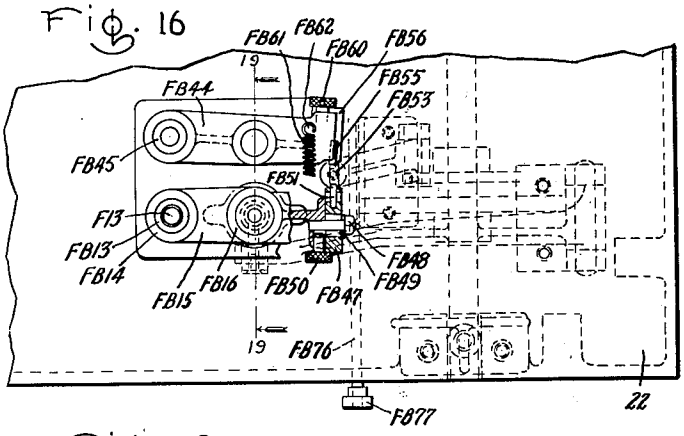


Fig. 19

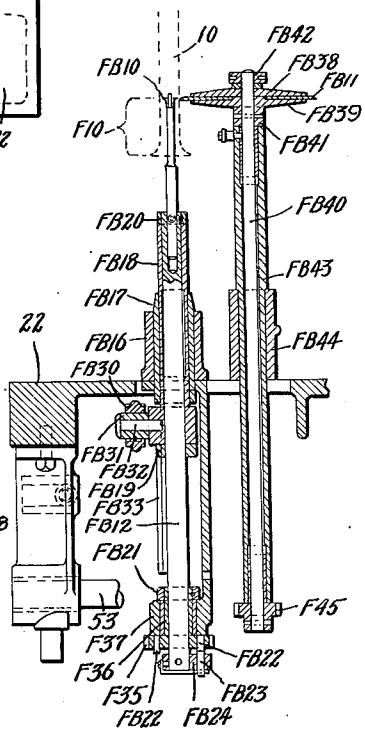


Fig. 18

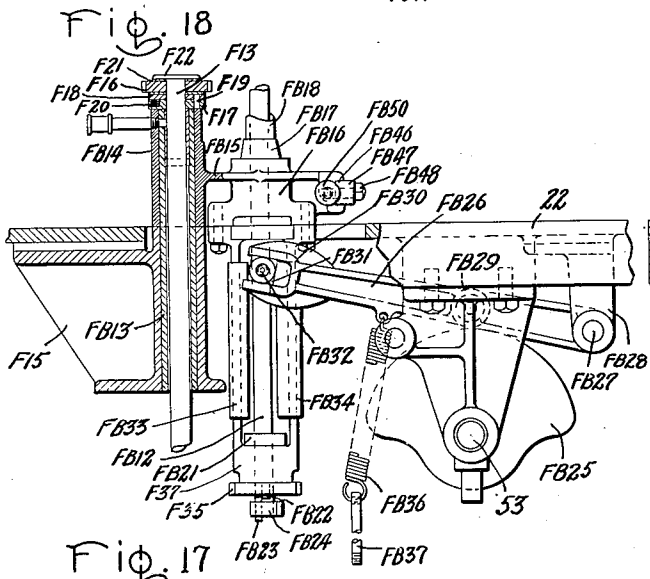


Fig. 17

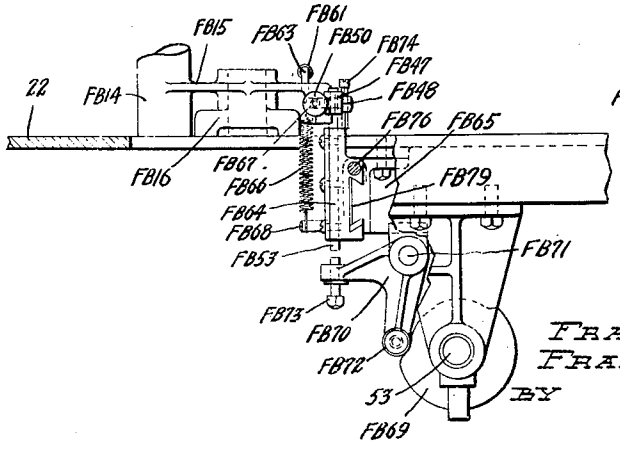
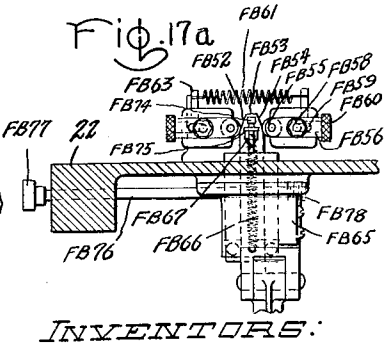


Fig. 17a



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UNITED STATES PATENT OFFICE.

FRANCIS J. RIPPL AND FRANK J. MALLOY, OF CLEVELAND, OHIO, ASSIGNORS TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

AUTOMATIC FLARE MACHINE.

Application filed July 8, 1921. Serial No. 483,334.

To all whom it may concern:

Be it known that we, FRANCIS J. RIPPL and FRANK J. MALLOY, citizens of the United States, residing at Cleveland, in the county of Cuyahoga, State of Ohio, have invented certain new and useful Improvements in Automatic Flare Machines, of which the following is a specification.

Our invention relates to lamp making machines and more particularly to automatic machines for making flares for incandescent lamps.

Our object is to provide an automatic machine for the production of flares from substantially long lengths of glass cylinders or tubing. In this specification, a flare will be understood to mean a piece of glass stem tubing on which a flare has been formed.

Heretofore, flares have been made from glass tubing which has been cut to length before flanging. An automatic machine for making flares is disclosed in Fagan Patent No. 866,347, September 17, 1907. However, in machines of this type, labor must be used to cut glass tubes of proper length from glass tubing. The glass tubes must then be properly placed in a hopper for feeding to the automatic flare machine.

In the machine embodying our invention, the uncut lengths of glass tubing are placed in suitable holding means and the ends of the tubing successively subjected to the various operations necessary to the proper flanging of the flare. The flare is then cut off from the glass tubing in the proper lengths by an improved glass cutting means.

More specifically, we have provided a carrier containing a series of suitable holding means for glass tubing and means for rotating the glass tube holding means. In proper sequence in the path of the end of the glass tubing, we have provided means for heating the end of the tubing, means for flanging the end of the tubing, means for gauging the length of the flare to be cut from the tubing, and means for cutting the flare from the tubing.

We are enabled to use long lengths of glass tubing without previous preparation and to secure a comparatively high rate of production of finished flares with a very small percentage of imperfect flares. The flares are uniform in length and the flanges thereof show practically no variations in shape or size.

In the accompanying drawings, Fig. 1 is a perspective view of a machine embodying our invention;

Fig. 2 is an elevation of the base of said machine showing a portion of the driving mechanism;

Fig. 3 is a top plan view of the machine of Fig. 1 with the upper part of the machine and the operating mechanisms removed for the sake of clearness;

Fig. 4 is an elevation view of the main driving shaft, partially in section;

Fig. 5 is an end elevation on the section lines 5—5 of Fig. 4;

Fig. 6 is a sectional elevation on the section line 6—6 of Fig. 3 showing the chuck, the lowering and the gauging mechanisms, and part of the driving and indexing mechanism;

Fig. 7 is a sectional plan view of the chuck mechanism on the section line 7—7 of Fig. 6;

Fig. 8 is an elevation of the lowering and gauging mechanisms on the section line 8—8 of Fig. 6;

Fig. 9 is a sectional elevation of the indexing mechanism on the section line 9—9 of Fig. 3;

Fig. 10 is an end elevation of the view of Fig. 9;

Fig. 11 is a top plan view of Fig. 9 on the line 11—11;

Fig. 12 is an elevation of a detail of Fig. 11;

Fig. 13 is an elevation, partially in section, on the line 13—13 of Fig. 3 showing the driving mechanism for the cutters;

Fig. 14 is a top plan view of the mechanism of Fig. 13 on the line 14—14;

Fig. 15 is a sectional elevation of the mechanism of Fig. 14 on the line 15—15;

Fig. 16 is a top plan view of the cutter mechanism with the cutters removed and the mechanism partly broken away to show the cutter separating mechanism;

Fig. 17 is a side elevation of Fig. 16 broken for the sake of clearness to show the cutter separating mechanism;

Fig. 17ª is an end elevation of Fig. 17 broken to show more clearly the cutter separating mechanism;

Fig. 18 is a side elevation of Fig. 16 broken for the sake of clearness to show the small cutter raising and lowering mechanism;

Fig. 19 is a sectional front elevation of the cutters on the line 19—19 of Fig. 16;

Fig. 20 is a fragmentary top plan view of the lower chuck;

Fig. 21 is a side elevation of the view of Fig. 20 showing the lower chuck opening mechanism and stopping mechanism;

Fig. 22 is a sectional elevation of the lower chuck on the line 22—22 of Fig. 20;

Fig. 23 is a sectional elevation of the flanging mechanism on the line 23—23 of Fig. 3;

Fig. 24 is a front elevation of the flanging mechanism, partially sectioned for the sake of clearness;

Fig. 24ª is a sectional plan on the line 24ª—24ª of Fig. 24;

Fig. 25 is an enlarged detail showing the flanging operation;

Fig. 26 is a diagram showing variations which may be made in cutting off a flare.

In general terms, the operation of the machine is as follows: A piece of glass tubing 10, Fig. 1, is placed in each of a series of rotating chucks A (see also Figs. 6 and 7) which are mounted on the carrier 11 more fully described hereinafter. The carrier 11 is so driven that each of the chucks A is intermittently advanced through a predetermined path in which a sequence of operations is performed upon the end of the glass tubing held in the chuck. Thus the glass tubing 10 is rotated about its own axis by the chuck and about an external axis by the carrier. At the first position, or position B, Fig. 3, the tubing is given a preliminary heating in the predetermined zone of cut-off by a gas burner 12. The tubing is then advanced to position C where it is further heated locally by the gas burners 13. At position D, to which the tubing is now brought, an intensive heat is applied to the zone of cut-off by the gas burners 14.

The gas burner 15 heats the zone of cut-off at position E while the cutting off mechanism F (shown in Figs. 13 to 22, inclusive) removes a section of tubing from the lower end of the tubing 10. In the present machine, the section of tubing removed is a flare 16 (Fig. 1) suitable for use in the manufacture of incandescent lamps. The flare 16 is discharged into a vibrating chute FC (Fig. 3) which delivers it to a suitable container.

The tubing 10 is now advanced to the position G where an intensive heat is applied to the lower end of the tubing by the gas burners 19, Fig. 3. The tubing is then moved to position H where it is further heated by the gas burners 20 while being flanged by the flanging mechanism K, (shown in Figs. 23, 24, and 25 inclusive).

At position L, the flanged tubing is permitted to cool and is then advanced to position M where the chuck A is opened by mechanism N (shown in Figs. 6, 7 and 8) and the tubing 10 lowered and gauged by the mechanism P. After the tubing has been gauged so that the proper length of flare 16 will be cut from tubing 10 at position E, the chuck A is permitted to close and is advanced to position B where a repetition of the cycle just described is begun.

The drive of the machine is effected by the motor 21 (Figs. 1 and 2) which is mounted in the base 22. The motor 21 through a belt 23 drives the countershaft 24 which is also mounted in the base 22. The countershaft 24 through the belt 25 drives the main driving shaft 26 (Figs. 3 and 4) which is suitably supported on the brackets 27 and 28 in the base 22. A safety connection is provided between the belt 25 and the main driving shaft 26 to prevent injury to the machine as a whole should any of the mechanisms become jammed. This connection consists of the gear 29 (Figs. 3, 4 and 5) fastened to the shaft 26 and rotatably carried on the shaft 26 a pulley 29ª which is driven by the belt 25. Inserted in the lug 29ᵇ on the hub extension of the pulley 29ª is hardened steel plug 29ᶜ which has a slot 29ᵈ therein for receiving a soft steel bar 29ᵉ held in place by the set screw 29ᶠ. The gear 29 has a hardened steel plug 29ᵍ, similar to the plug 29ᶜ, inserted in the hub thereof so as to receive the soft steel bar 29ᵉ in a slot 29ʰ. When the pulley 29ª is driven by the belt 25, the soft steel bar 29ᵉ causes the gear 29, and the attached shaft 26 to be rotated under ordinary circumstances. However, should any of the operating mechanisms become jammed, the driving means tends to stall and puts a greater burden upon the soft steel bar 29ᵉ which is thereupon sheared between the edges of the hardened steel plugs 29ᶜ and 29ᵍ automatically relieving the strain upon the operating mechanisms and the driving means by permitting the pulley 29ª to be freely rotated upon the shaft 26. The safety connection is again placed into operative condition by removing the broken steel bar 29ᵉ and inserting a new one in its place.

The gear 29, fastened to the main shaft 26, meshes with a gear 30 (Figs. 2, 6 and 8) fastened to the intermediate shaft 31 which is supported from the base 22 by the brackets 32 and 33. To the inner end of the shaft 31 is fastened a bevel gear 34 (Fig. 6) which meshes with and drives the bevel gear 35 (Figs. 6 and 9) fastened to the lower end of the vertical shaft 36 which is rotatably supported in the tubular shaft

37. To the upper end of the shaft 36 is fastened a large gear 38 (Fig. 6) which meshes with and drives each chuck A as more fully described hereinafter. The tubular shaft 37 is suitably supported in the base 22 and the column 39 mounted thereon and has fastened to its upper end the carrier 11 previously mentioned. The tubular shaft 37 and carrier 11 are indexed by means of a Geneva gear 40 (Figs. 6, 9 and 11) which is attached to the lower end of the shaft 37 and which has a locking disc 41 fastened to its upper side. The Geneva gear 40 is driven by the Geneva pinion 42 (Figs. 9, 10 and 11) which is fastened to the vertical shaft 43 suitably mounted in the support 44 fastened to the under side of the base 22. A gear 45, rotatably held on the shaft 43 and continuously driven by the gear 46 fastened to the vertical shaft 36, drives the Geneva pinion 42 through the clutch 47 which slides on the shaft 43 and which is connected to the Geneva pinion 42 by a pin 48 fastened in the pinion 42 and working in a recess 49 in the clutch 47. A recess 50 in the clutch 47 is intermittently brought into engagement with a pin 51 fastened to the gear 45, in order to drive the Geneva pinion 42, by the action of the cam 52 fastened to the cam shaft 53 suitably supported by brackets fastened to the base 22 and driven from the intermediate shaft 31 by the gear 54 (see Figs. 2, 3 and 6) thereon which drives the gear 55 on the cam shaft 53 through the idler gear 54′ mounted on the shaft 55′ carried in the base 22. The action of the cam 52 (Figs. 9 and 10) is transmitted through the lever 56 which is pinned at 57 to the bracket 58 and which has pinnned near the middle thereof a roller 59 which rides on the cam 52. The lower end of the lever 56 is pinned to a link 60 whose other end is connected to a lever 61 fastened to the shaft 62 carried in the support 44. To the shaft 62 is fastened a yoke 63 which engages a groove 64 in the clutch 47 so as to control the vertical position of the clutch on the shaft 43. A spring 65 fastened to the link 60 and to the base 22 tends to hold the roller 59 against the cam 52. The outline of the cam 52 is such that once every revolution thereof the lever 56 swings in toward the cam 52 and, through the link 60, lever 61, shaft 62 and yoke 63, forces the clutch 47 downward so that the recess 50 therein engages the pin 51 on the continuously rotating gear 45 to drive for one revolution thereof the clutch 47 and, through the pin 48, the Geneva pinion 42 which in turn drives the Geneva gear 40. The Geneva gear 40 through the tubular shaft 37 to the upper end of which is attached the carrier 11 advances the chucks A mounted thereon through an angle sufficient to move them from one position to the successive position. As the single revolution of the Geneva pinion 42 is completed, the cam 52 moves the lever 56 outward therefrom which causes the yoke 63 to lift the clutch 47 to bring the recess 50 out of engagement with the pin 51 on the continuously rotating gear 45. A pair of springs 67 (Fig. 10) carried in recesses 68 in the gear 45 receives the thrust of the clutch 47 when it engages with the gear 45.

In order to insure the stopping of the carrier 11 with the chucks A in the exact predetermined positions for the several steps of the operation as previously described, the locking disc 41, previously mentioned, is attached to the upper surface of the Geneva gear 40 (Figs. 9, 10 and 11) and has a series of notches 69 in the periphery thereof corresponding to the number of positions on the machine. One of these notches 69 is engaged by the nose 70 on one arm of a crank 71 mounted on the pin 72 fastened in the support 44. A spring 73 fastened to the other arm of the crank 71 and to the support 44 tends to hold the nose 70 in engagement with a notch 69. As the Geneva pinion 42 begins to engage the Geneva gear 40 for the rotation thereof, the nose 70 is removed from engagement with th notch 69 by a cam-like projection 74, fastened to the Geneva pinion 42, which strikes a projection 75 (see also Fig. 12) fastened in an arm of the crank 71 so that the crank 71 is forced away from the locking disc 41. As soon as the Geneva gear 40 and attached locking disc 41 have been rotated by the Geneva pinion 42 through an angle sufficiently large to prevent the engagement of the nose 70 with the notch 69 which it has just released, the projection 74 on the pinion 42 releases the projection 75 on the crank 71 thus permitting the crank 71 to return toward the locking disc 41 bringing the nose 70 into position to engage the succeeding notch 69 as it is rotated into place. The projection 75 may be adjusted to change the relative time at which it is engaged by the projection 74 by adjusting the screw 76 (Fig. 12) which is seated in the projection 75 and which screws into the hub of the crank 71. When properly adjusted the projection 75 is fastened into place by the bolt 77 which passes through a slot 78 in the projection 75 and screws into an arm of the crank 71.

Cutting off mechanism.—As previously described, the glass tubing 10 with the flange on the lower end thereof is heated on the line of cut-off in the positions B, C and D and also in the cutting-off position E (see Fig. 3). The cutting-off mechanism F (see Fig. 1) comprises mechanism FA (Figs. 20, 21 and 22) for holding and synchronously rotating the flare which is being cut from the glass tubing 10 and mechanism FB

(Figs. 16, 17, 18 and 19) for performing the actual cutting off of the flare in the preheated zone. Briefly, the operation is carried out as follows: The gauged and lowered glass tube 10, which has previously been flanged and preheated in the zone of cut-off as described hereinafter, is advanced by the carrier 11 into the position E. Immediately the chuck mechanism FA acts to hold the lower end of the tubing 10 and to rotate it synchronously with the upper end, the tubing 10 having an intermediate softened portion due to the heating in the zone of cut off. The cutting mechanism FB then operates to cut the tubing 10 leaving the flare F^{10} (Fig. 1) in the chuck FA. Thereupon the chuck FA releases the flare F^{10} which is discharged into a chute FC which delivers it to a suitable container. In order to simplify the description, each part of the mechanism will be described separately giving the drive the letter F of the cutting off mechanism as a whole; the tubing holding means or chuck, the letters FA; the means for cutting the tubing, the letters FB; and the delivery chute, the letters FC; in each case the proper letters being coupled with suitable numerals.

The cutting off mechanism drive is effected from the main driving shaft 26 by a bevel gear F^{11} (Figs. 4 and 13) attached thereto which meshes with and drives a bevel gear F^{12} (Fig. 13) fastened to the vertical shaft F^{13} which has suitable bearings in the housing F^{14} and the bracket F^{15} to which the housing F^{14} is attached. The bracket F^{15} is fastened to the base 22. A gear F^{16} (Figs. 13, 16 and 18) rotatably held on the upper end of the shaft F^{13} is normally caused to rotate therewith by the friction clutch F^{17} fastened to the shaft F^{13} so as to drive the chuck FA as described hereinafter (Fig. 18). The clutch F^{17} has a leather faced disc F^{18} driven by a pin F^{19} fastened in the clutch and held against the gear F^{16} by a spring F^{20} carried in a recess in the clutch F^{17}. A leather disc F^{21}, between the gear F^{16} and the retaining screw F^{22} fastened in the end of the shaft F^{13}, also tends to rotate the gear F^{16} with the shaft F^{13}.

To the lower end of the shaft F^{13} is also fastened a gear F^{23} (Figs. 13 and 14) which effects the drive of each of the two cutters which form a part of the cutting mechanism FB as more completely set forth hereinafter. The gear F^{23} drives the idler gear F^{24} (see also Fig. 15) which is rotatably mounted on the pin F^{25} fastened in the housing F^{14}. At this point in the drive, provision is made for changing the speed of rotation of the cutters relative to the speed of rotation of the chucks by the following described means. The gear F^{24} drives another idler gear F^{26} which is rotatably carried on a pin F^{27} mounted in an arm of the member F^{28} which is pivoted on the pin F^{25} and locked into position by a bolt F^{29} which screws into the housing F^{14} and which works in a slot F^{30} on the other arm of the member F^{28}. Various sizes of gears may be substituted for the gear F^{26} to secure the desired speed of rotation. The member F^{28} is so positioned that the gear F^{26} meshes with and drives a gear F^{31} mounted on the short vertical shaft F^{32} suitably mounted in the housing F^{14}. Near the upper end of the shaft F^{32} is fastened a gear F^{33} which drives the gear F^{34} rotatably carried on the shaft F^{13}. The gear F^{34} drives a gear F^{35} (see also Figs. 18 and 19) with tubular hub extension F^{36} which is rotatably mounted in the bracket F^{37} more fully described hereinafter. The gear F^{35} drives the smaller of the two cutters as hereinafter described.

Just above the gear F^{33} on the shaft F^{32} is fastened a bevel gear F^{38} (Figs. 13 and 14) which drives the bevel gear F^{39} fastened on the horizontal shaft F^{40} suitably carried in the housing F^{14}. On the end of the shaft F^{40} opposite to the gear F^{39} is fastened a worm gear F^{41} which drives a worm wheel F^{42} fastened on the vertical shaft F^{43} mounted in the housing F^{14}. Below the worm wheel F^{42} and on the shaft F^{43} is fastened a gear F^{44} which drives the gear F^{45} (see also Fig. 19) connected to the larger of the cutters as more fully described hereinafter.

The chuck mechanism includes a main member FA^{10} (Figs. 20, 21 and 22) which is carried on a ball race FA^{11} mounted in an arm FA^{12} of the bracket FA^{13} mounted on the base 22. Around the periphery of the upper part of the main member FA^{10} is cut a gear FA^{14} which meshes with and is driven by the gear F^{16} (see Figs. 13, 16 and 18) previously described. Fastened to the pin FA^{15} (Fig. 22) which is carried in the lugs FA^{16} (Fig. 20) on the top of the member FA^{10}, is a vertical arm FA^{17} which has at its upper end a V-shaped engaging finger FA^{18}. To the end of the pin FA^{15} is fastened a horizontal arm FA^{19} whose end is rounded and has teeth FA^{20} which mesh with similar teeth FA^{21} on the end of the horizontal arm FA^{22} similar to arm FA^{19} and fastened to the end of the pin FA^{23} (see also Fig. 21) carried in the lugs FA^{24} on the main member FA^{10}. A vertical arm FA^{25} similar to the arm FA^{17} is fastened to the pin FA^{23} and fastened to the upper end of the arm FA^{25} is a V-shaped engaging finger FA^{26} similar to the finger FA^{18}. Through the teeth FA^{20} and FA^{21} the motion imparted to one engaging finger is correspondingly imparted to the other engaging finger. A spring FA^{27}, fastened at the middle to a pin FA^{28} mounted on the member FA^{10} and at each end to the horizontal arms FA^{19}

and FA[22], tends to close the engaging fingers FA[18] and FA[26] toward each other. The engaging fingers FA[18] and FA[26] are caused to separate as follows: A rod FA[29] (Fig. 22) is seated at its upper end in the horizontal arm FA[19] being vertically aligned in a suitable hole in the main member FA[10] and has a roller FA[30] pinned in its lower end. The roller FA[30] rides on the surface of a ring-shaped arm FA[31] disposed concentric with the main member FA[10] and fastened to a vertical rod FA[32] which is slidably supported in the bracket FA[13]. A spring FA[33] (Figs. 21 and 22) mounted around the rod FA[32] between the stop FA[34] fastened thereto and the base 22 tends to hold the rod FA[32] in a lowered position which may be regulated by adjusting the position of the arm FA[31] relative to the rod FA[32]. The angular alignment of the rod FA[32] is maintained by an arm FA[35] fastened to the lower end thereof and having in its other end a slot which receives the pin FA[37] mounted in the base 22. The rod FA[32] is raised to force the rod FA[29] upward by means of the arm FA[31], and thereby to cause the separation of the engaging fingers FA[18] and FA[26], by the action of a cam FA[38] fastened to the cam shaft 53. The action of the cam FA[38] is transmitted to the rod FA[32] by the crank FA[39] which is pivoted on the pin FA[40] mounted in the base 22 and which has on one arm a roller FA[41] riding on the cam FA[38] and on the other arm an adjustable bolt FA[42] which engages the rod FA[32] to raise the same when so acted upon by the cam FA[38]. The amount of lift given to the rod FA[32] by the bolt FA[42] may be regulated by adjusting the bolt FA[42] in the arm of the crank FA[39]. The contour of the cam FA[38] is such that once during every revolution the engaging fingers FA[18] and FA[26] are caused to be separated and then are permitted to be brought together again by the action of the spring FA[27].

As previously stated, the rotation of the chuck FA is stopped after the flare F[10] has been cut off to permit the discharge of the same and to permit the indexing of the succeeding glass tubing 10 into position. The chuck is opened after its rotation has been stopped for the discharge of the flare and is closed again after it has started to rotate. The chuck is preferably stopped in a predetermined position to permit the proper discharge of the flare F[10] and to provide clearance between the engaging fingers FA[18] and FA[26] and the succeeding glass tubing 10. The position of stopping is preferably with the common center line of the two engaging fingers FA[18] and FA[26] perpendicular to the path of rotation of the glass tubing 10. The stopping of the chuck is effected in the following manner. A projection FA[43] (Fig. 20) is fastened to the upper surface of the main member FA[10] so that it may be engaged by the head of a plunger FA[44] which works in a corresponding recess in the arm of the crank FA[46] which is pivoted at FA[47] on the bracket FA[13]. A spring contained in the recess of the crank FA[46] between the bottom thereof and the plunger FA[44] absorbs the shock when the projection FA[43] suddenly strikes the head of the plunger FA[44] which is caused as explained hereinafter. The plunger FA[44] tends to engage the projection FA[43] through the action of a spring FA[49] fastened to an arm of the crank FA[46] and to the housing which encloses a large portion of the cutting off mechanism above the base 22 and which is not shown in the drawings. The amount of the projection FA[43] engaged by the plunger FA[44] may be regulated by adjusting the bolt FA[50] (Fig. 21) which works in one arm of the crank FA[46] and butts against the pin FA[51] fastened in the bracket FA[52] mounted on the base 22. The plunger FA[44] is caused to release the projection FA[43] by the action of a cam FA[53] fastened to the cam shaft 53. The action of the cam FA[53] is transmitted through a crank FA[54] pivoted on the pin FA[40] and having in one arm a roller FA[55] riding on the cam FA[53] and in the other arm an adjustable bolt FA[56] which engages a rod FA[57] slidably supported in the bracket FA[52] and having a roller FA[58] (Fig. 20) pinned in the upper end thereof which engages the beveled edge of an arm of the crank FA[46] to turn the crank FA[46] about its pivot FA[47] and thus withdraw the plunger FA[44] from engagement with the projection FA[43] thereby permitting the rotation of the chuck through the friction clutch F[20] (Fig. 18) previously mentioned. The rod FA[57] is normally held in a lowered position by the action of a spring FA[59] encircling the rod FA[57] and bearing against a stop FA[60] fastened thereto and against the base 22. The rod FA[57] is held in angular alignment by an arm FA[61] attached thereto and having a slot FA[62] in its end which receives the pin FA[37]. The amount of upward lift of the rod FA[57] may be regulated by adjusting the bolt FA[56] in the arm of the crank FA[54]. The contour of the cam FA[53] is such that once every revolution thereof the projection FA[43] is released from the plunger FA[44] to permit the rotation of the chuck and then for a somewhat shorter interval the plunger FA[44] is permitted to engage the projection FA[43] and so stop the rotation of the chuck to permit the discharge of the flare F[10] while the machine is indexed.

The cutters and mechanism.—The flare F[10] (Fig. 19) is cut from the tubing by a small cutter FB[10] on the inside of the glass tubing 10 and a large cutter FB[11] on the out-

side of the tubing 10. In general the action of the cutters is as follows: The small cutter FB^{10} is raised up inside the tubing 10 as the latter is being engaged by the chuck FA and when the cutter FB^{10} is level with the large cutter FB^{11}, the two cutters are gradually brought together to cut off the flare F^{10} both cutters being rotated so that the peripheral speed of each cutter is substantially the same as the peripheral speed of the glass surface being cut. After the flare F^{10} has been cut off, the two cutters are separated and the small cutter FB^{10} being lowered to permit the discharge of the flare F^{10} and the indexing of the succeeding glass tubing 10. The small cutter FB^{10} is rotated only while in the raised position.

The small cutter FB^{10} is mounted in the upper end of the vertical shaft FB^{12} which is supported in the following manner. The bracket F^{15}, previously mentioned, supports a tubular member FB^{13} (Figs. 16 and 18) about which is pivoted the sleeve FB^{14} of the bracket FB^{15}, the sleeve FB^{14} resting on the bracket F^{15}. A second bracket F^{37}, previously mentioned, is fastened below the sleeve FB^{16} of the bracket FB^{15}. A tubular member FB^{17} (Fig. 19) carried by the sleeve FB^{16} provides a suitable bearing for the tubular elevating member FB^{18} which is rotatably held on the vertical shaft FB^{12} at the lower end by the set-screw collar FB^{19} and at the upper end by the taper pin collar FB^{20}. The lower end of the vertical shaft FB^{12} is rotatably supported in the hub extension F^{36} of the gear F^{35}, previously described, the gear F^{35} being rotatably carried in the lower end of the bracket F^{37} and being held thereon by the taper pin collar FB^{21} fastened to the upper end of the hub extension F^{36}. The vertical shaft FB^{12} is driven as follows: The gear F^{35} has two pins FB^{22} fastened in its lower side and when the shaft FB^{12} is elevated as described hereinafter one of the pins FB^{22} engages and drives a pin FB^{23} fastened in a collar FB^{24} mounted on the lower end of the vertical shaft FB^{12} so that the shaft FB^{12} and cutter FB^{10} are rotated. The elevation of the cutter FB^{10} and the shaft FB^{12} is effected through the elevating member FB^{18} by the action of the cam FB^{25} (Fig. 18) mounted on the cam shaft 53. The action of the cam FB^{25} is transmitted through a lever FB^{26} which is pivoted at FB^{27} to the bracket FB^{28} fastened to the base 22 and which has a roller FB^{29} riding on the cam FB^{25}. A slot FB^{30} in the end of the lever FB^{26} engages a square block FB^{31} which is rotatably mounted on the pin FB^{32} fastened in the lower end of the elevating member FB^{18}. The member FB^{18} is free to move vertically but the angular alignment thereof is maintained by the guides FB^{33} and FB^{34} mounted on the bracket F^{37} and engaging grooves on the lower end of the member FB^{18}. A spring FB^{36} fastened to the lever FB^{26} and to a rod FB^{37} mounted on the base 22 tends to hold the elevating member FB^{18} in a lowered position. The contour of the cam FB^{25} is such that during the revolution thereof the small cutter FB^{10} is caused to be elevated for cutting the tubing which elevation causes the engagement of the driving means of the cutter as previously explained. After an interval during which the flare F^{10} is cut off from the tubing the small cutter FB^{10} is caused to be lowered to provide clearance.

The large cutter FB^{11} (Fig. 19) is held between the plates FB^{38} and FB^{39} which are mounted on the vertical shaft FB^{40} between the taper pin collar FB^{41} fastened thereto and the nut FB^{42} which screws on the end of the shaft FB^{40}. The shaft FB^{40} is rotatably carried in the sleeve FB^{43} mounted in the bracket FB^{44} which is pivoted about the tubular member FB^{45} (see Fig. 16) which is a part of the bracket F^{15} previously mentioned. The shaft FB^{40} is driven by the gear F^{45}, previously described, which is fastened to the lower end thereof.

In order to provide clearance the two cutters FB^{10} and FB^{11} are normally separated but when prepared to cut are permitted to advance toward each other. This action of the cutters is effected in the following manner. On the edge of the bracket FB^{15}, which carries the small cutter FB^{10}, is a groove FB^{46} (Fig. 18) which receives the member FB^{47} (see also Figs. 16 and 17). A bolt FB^{48} working in the slot FB^{49} (Fig. 16) in the member FB^{47} fastens the member FB^{47} to the bracket FB^{15}. The head of the set-screw FB^{50} which screws into the bracket FB^{15} bears against the end of the member FB^{47} and assists in positioning this member in the groove FB^{46}. The inner end of the member FB^{47} has pinned therein a roller FB^{51} (Fig. 16) which rides upon the inclined surface FB^{52} (Fig. 17a) of the wedging bar FB^{53}. Riding on the opposite inclined surface FB^{54} of the wedging bar FB^{53} is a roller FB^{55} pinned in the member FB^{56} which is held in the groove in the end of the bracket FB^{44} by a bolt FB^{58} working in a slot FB^{59} in the member FB^{56} which is similar to the member FB^{47}. The head of the set-screw FB^{60} which screws into the bracket FB^{44} bears against the end of the member FB^{56} and assists in positioning the member FB^{56} in the groove. A spring FB^{61} fastened to the pin FB^{62} mounted on the bracket FB^{44} and to the pin FB^{63} (Fig. 17) mounted on the bracket FB^{15} tends to draw the two brackets together swinging the brackets FB^{15} about the tubular member FB^{13} and the bracket FB^{44} about the tubular member FB^{45}. This action of the spring FB^{61} is normally pre-

vented by the wedging bar FB[53] which separates the rollers FB[51] and FB[55] but which is withdrawn in the following manner to permit the advance of the cutters FB[10] and FB[11] when they are in position to cut the flare F[10] from the glass tubing. The wedging bar FB[53] is slidably mounted in a guiding bracket FB[64] (Fig. 17) which is mounted free to move horizontally in a bracket FB[65] fastened to the base 22. A spring FB[66] fastened to a pin FB[67] on the wedging bar FB[53] and to a pin FB[68] on the guiding bracket FB[64] tends to withdraw the wedging bar from between the rollers FB[51] and FB[55] but is normally prevented from so doing by the action of a cam FB[69] mounted on the cam shaft 53. The action of the cam FB[69] is transmitted through the crank FB[70] which is pivoted at FB[71] in the bracket FB[65]. The crank FB[70] has pinned in one arm a roller FB[72] riding on the cam FB[69] and has fastened in the other arm an adjustable bolt FB[73] which engages the lower end of the wedging bar FB[53] to raise the bar when so acted upon by the cam FB[69]. The engagement of the bolt FB[73] with the wedging bar FB[53] may be regulated by adjusting the position of the bolt FB[73] in the arm of the crank FB[70]. The contour of the cam FB[69] is such that the wedging bar FB[53] is normally held up to separate the brackets FB[15] and FB[44] until the cutters FB[10] and FB[11] are in position to act whereupon the wedging bar FB[53] is permitted to be withdrawn by the action of the spring FB[66]. The amount of withdrawal of the wedging bar FB[53] is determined by the position of the adjustable bolt FB[74] (Figs. 17 and 17[a]) which screws in the arm FB[75] fastened to the upper end of the wedging bar and which strikes against the top of the guiding bracket FB[64] to limit the downward movement of the bar FB[53]. The amount of withdrawal may be regulated by adjusting the bolt FB[74] in the arm FB[75].

The horizontal position of the cutters FB[10] and FB[11] relative to the glass tubing 10 may be regulated by adjusting the rod FB[76] (Figs. 16, 17 and 17[a]) which has a head FB[77] projecting outside the base 22 and which has a threaded portion working in a thread in the guiding bracket FB[64] and whose end is rotatably held at FB[78] in the bracket FB[65]. The action of the rod FB[76] is such that the guiding bracket FB[64] is moved horizontally along the slide FB[79] on the bracket FB[65], the brackets FB[15] and FB[44] being moved about their respective pivots by the presence of the wedging bar FB[53] between their respective rollers. By properly adjusting the horizontal position of the cutters FB[10] and FB[11] relative to the glass tubing 10, the upper end of the flare F[10] may be made substantially flush with the main portion of the tube, may be turned inwardly or outwardly as shown in Fig. 26. It is believed that an advantage exists in turning the upper end of the flare slightly outwardly as shown in C of Fig. 26 when leading-in wires are loaded through the flare on the usual stem making machines. This also prepares the glass tubing for the subsequent flaring operation.

The flare F[10], which is cut from the glass tubing 10 at the position F, when released by the engaging fingers FA[18] and FA[26] (Fig. 22) falls upon an incline FC[10] (Fig. 1) which is fastened to the main member FA[10] of the chuck and which slants toward the discharge chute FC[11] (Figs. 1 and 3) to be delivered to a suitable container FC[12] mounted on a side of base 22. An air jet FC[13] (see Fig. 3) which is suitably supported on the base 22 directs a stream of air upon the flare F[10] to blow the flare into the chute FC[11]. In order to deliver the flare F[10] into the container FC[12], the chute FC[11] is agitated in the following manner. A ball link FC[14] (Fig. 1) has one end held in a socket FC[15] on the chute FC[11] and the other end held in an eccentric socket FC[16] mounted on the upper end of the rod FC[17] which is rotatably held in the bracket FC[18] fastened to the base 22. The rod FC[17] is driven from the main driving shaft 26 by means of the belt FC[19] (Figs. 3 and 4) driven by the pulley FC[20] on the shaft 26 and driving the pulley FC[21] on the rod FC[17]. A spring FC[22] fastened to the chute FC[11] and to the bracket FC[18] tends to draw the chute toward the base. The lower end of the chute FC[11] is pivoted on a pin FC[23] (see Fig. 3) carried in the bracket FC[24] slidably on the base 22 and fastened thereto by the bolt FC[25]. As the rod FC[17] is rotated the ball link FC[14] working in the eccentric socket FC[16] alternately raises and lowers the chute FC[11] about the pivot pin FC[23] producing sufficient agitation to cause the flare F[10] to pass down the inclined surface of the chute FC[11] into the container FC[12].

The flanging mechanism.—The lower end of the tubing 10, which has previously been heated at position G as hereinbefore set forth, is flanged by the flanging mechanism K (Figs. 1 and 3) which is located at position H. The flange K[10] (Fig. 25) is accomplished by a pencil K[11] (Figs. 23, 24 and 25) mounted in a stirrup K[12] which is pivoted on the two standards K[13] which are fastened to the cap K[14] on the upper end of the tubular member K[15]. The tubular member K[15] is rotatably held in the elevation adjusting member K[16] which screws into a collar K[17] fastened to the standard K[18]. A set screw K[19] working in the collar K[17] forces a soft metal plug K[20] against the thread of the adjusting member K[16] to lock the latter in place. A thrust ball race K[21] carried on a flange K[22] on the lower end of

the tubular member K^{15} takes up the thrust between the flange K^{22} and the adjusting member K^{16} when the tubular member K^{15} is elevated against the adjusting member K^{16} as more fully described hereinafter.

The upper end of each of the two uprights K^{23} is pinned one to each side of the stirrup K^{12} and to the cap K^{24} which is fastened to the upper end of the elevating tube K^{25}. The longitudinal movement of the elevating tube K^{25} relative to the tubular member K^{15} causes a movement of the stirrup K^{12} about the pivots on the standards K^{13} to bring the pencil K^{11} through the successive positions assumed in forming the flange K^{10} on the glass tubing 10. A pin K^{26} fastened in the cap K^{14} and working in a corresponding aperture K^{27} in the cap K^{24} serves as a guide for vertical movement of the cap K^{24} relative to cap K^{14} and also transmits the rotative motion imparted to the elevating tube K^{25}, as hereinafter set forth, to the tubular member K^{15}.

The elevating tube K^{25} is caused to rotate by power transmitted to the pulley K^{28}, fastened to the tube K^{25}, by a belt K^{29} which runs over the idler pulleys K^{30} and K^{31} (see also Figs 1 and 3) fastened to the edge of the base 22 and which is driven by the pulley K^{32} fastened to the motor 21. The tube K^{25} is raised to bring the pencil K^{11} into operative relation with the glass tubing 10 in the following manner. Positioned on the lower end of the tube K^{25} by the collars K^{33} (Fig. 24) and K^{34} is an adjusting member K^{35} which screws into a horizontal plate K^{36}. The plate K^{36} is locked on the member K^{35} by the set screw K^{37} (see Fig. 24[a]) which wedges a plug K^{38} against the soft metal plug K^{39} to force the plug K^{39} against the thread of the member K^{35}, the plugs K^{38} and K^{39} being held in the plate K^{36} in passages at right angles to each other. A vertical guide rod K^{40} sliding in the standard K^{18} has its lower end fastened in the plate K^{36} to maintain its alignment during the vertical movement thereof. A roller K^{41} is pinned to one end of the plate K^{36} and is held against the cam K^{42}, which is fastened on the cam shaft 53 previously described, by the action of a spring K^{43} fastened to the plate K^{36} and to the base 22. The contour of the cam K^{42} is such that once during every revolution the elevating tube K^{25} is gradually raised through the roller K^{41} and the plate K^{36}. The pulley K^{28} carries upward the helical spring K^{44} resting thereon and bearing against the under side of the flange K^{22} which action tends to force the tubular member K^{15} upward until the thrust ball race K^{21} is brought against the adjusting member K^{16} where the upward movement of the member K^{15} is halted while the upward movement of the elevating tube K^{25} is continued. This further movement of the tube K^{25} causes the pencil K^{11} to pass through the positions desirable for forming the flange K^{10} on the glass tubing 10. The tube K^{25} is then lowered, the pencil K^{11} returned to a normal position and the tubular member K^{15} also being lowered.

It sometimes happens that the glass tubing 10 breaks while being flanged and the broken off portion of the tube falls around the pencil K^{11}. It is desirable that this broken tube be removed from the pencil K^{11} before the succeeding glass tubing 10 is brought into position for flanging. To accomplish this removal, there is provided a stripping bar K^{45} (Figs. 23 and 24) which is fastened on the upper end of the half-round rod K^{46} carried in the elevating tube K^{25} and normally resting on a shoulder K^{47} therein. A half-round plug K^{48} inserted in the upper end of the tube K^{25} maintains the angular alignment of the rod K^{46}. To the lower end of the rod K^{46} is fastened a rod K^{49} whose lower end strikes the head of an adjustable bolt K^{50} carried in the bracket K^{51} and so arrests the downward movement of the stripping bar K^{45} when the elevating tube K^{25} descends after flanging. The pencil K^{11} thus descends past the stripping bar K^{45} and any broken tubing, which may be lodged thereon, is removed. The adjustable bolt K^{50} may be regulated to alter the position at which the downward movement of the rod K^{49} is arrested. The rod K^{49} tends to be brought into a lowered position relative to the elevating tube K^{25} by the action of a spring K^{52} which encircles the rod K^{49} bearing against the aligning member K^{53} attached thereto and a shoulder K^{54} in the tube K^{25}.

The chuck, lowering and gauging mechanism.—The chuck A (Figs. 1 and 6) holds and rotates the glass tubing 10 as it is advanced to each position by the carrier 11 and worked upon by the several mechanisms. The chuck has a main tubular member A^{10} (Figs. 6 and 7) which is rotatably held in suitable bearings on the carrier 11 by a collar A^{11} fastened to the upper end thereof. The main member A^{10} is continuously rotated by means of a gear A^{12} attached near the upper end thereof and driven by the large gear 38 previously described. A member A^{13} sliding inside the main member A^{10} has attached to its lower end, by links A^{14}, the wedges A^{15} which hold the tubing 10 through a wedging action against the conical surface A^{16} of the ring A^{17} which is inserted in the lower end of the main member A^{10}. The member A^{13} is normally held in a lowered position by the action of a spring A^{18} bearing against its upper end and against a stop A^{19} fastened in the upper end of the main member A^{10}. A collar A^{20} sliding on the main member A^{10} and rotating therewith engages the member A^{13} by means of the two

bolts A^{21} which work in slots A^{22} in the main member A^{10} so that when the collar A^{20} is raised the wedges A^{15} are raised to release the tubing 10. A groove A^{23} in the collar A^{20} receives the rollers A^{24} mounted on the pins A^{25} fastened in the arm A^{26} whose end is pivoted in the member A^{27} fastened to the tubular shaft 37. When the arm A^{26} is lifted by the chuck opening mechanism N, the collar A^{20} is raised relative to the main member A^{10} causing the wedges A^{15} to be raised to release the glass tubing 10. Upon the release of the chuck opening mechanism N, the spring A^{18} causes the wedges A^{15} to re-engage the tubing 10. To assist in positioning the glass tubing 10 in the chuck a guide sleeve A^{28} is inserted in the main member A^{10} and fastened to the stop A^{19} in the upper end thereof.

The chuck opening mechanism has a vertical lifting rod N^{10} (Figs. 6 and 8) which slides in a guiding standard N^{11} mounted on the base 22. Into the split upper end of the rod N^{10} is screwed and locked by the set screw collar N^{12} a support N^{13} carrying the roller N^{14} which engages the chuck arm A^{26} to lift the same when the rod N^{10} is raised. The rod N^{10} is raised by the action of the cam N^{15} transmitted through the crank N^{16} and the link N^{17} which connects the end of one arm of the crank N^{16} and the lower end of the rod N^{10}. The crank N^{16} is pivoted at N^{18} to a bracket N^{19} on the base 22 and in its second arm has a roller N^{20} which is held against the cam N^{15} by the action of a spring N^{21} fastened to the first arm of the crank N^{16} and to a pin N^{22} fastened to the bracket 33 on the base 22. The cam N^{15} is fastened to the cam shaft 53 and has a contour such that once every revolution thereof the rod N^{10}, through the crank N^{16} is raised to lift the chuck arm A^{26} and so open the chuck A to permit the glass tubing 10 to be released while being gauged.

As the glass tubing 10 is released the gauging tube P^{10} (Figs. 6 and 8) is raised or advanced to receive the flange on the fiber disc P^{11} to prevent shock or jar to the flange. The disc P^{11} is fastened to the metal disc P^{12} which is fastened to the short rod P^{13} rotatably carried in the flanged member P^{14}. The flanged member P^{14} is inserted in the upper end of the gauging tube P^{10} and fastened by the set screw collar P^{15}. The gauging tube P^{10} is slidably supported in an arm P^{16} of the guiding standard N^{11} of the chuck opening mechanism and has inserted in the lower end thereof a gauging rod P^{17} which is fastened in the tube P^{10} by means of the set screw collar P^{18}. The gauging rod P^{17} is raised or advanced by the action of the spring P^{19} fastened to the bracket 33 and to one arm of the crank P^{20} which is pivoted in the bracket P^{21} mounted on the base 22 and whose other arm is connected by a link P^{22} to an arm P^{23} fastened to the lower end of the gauging rod P^{17}. The gauging tube P^{10} and gauging rod P^{17} are caused to be lowered by the action of a cam P^{24} fastened on the cam shaft 53 and bearing against the roller P^{25} pinned to an arm of the crank P^{20}. The contour of the cam P^{24} is such that, once every revolution thereof, the gauging tube P^{10} is lowered or returned from its raised or advanced position to gauge the glass tubing 10 by limiting the downward movement of the tubing 10 while the chuck A is open, the flange K^{10} resting on the fiber disc P^{11} which may be rotated in the flange member P^{14} by the rotating tubing 10. After the chuck A has closed, the cam P^{24} releases the roller P^{25} so that the gauging tube P^{10} may be raised by the action of the spring P^{19} but the elevation of the tube P^{10} is prevented for a time by the presence of the glass tubing 10. When the tubing 10 has been removed from the disc P^{11} by the indexing of the carrier 11, the gauging tube P^{10} is raised by the spring P^{19} to receive the released glass tubing 10 in the succeeding chuck A thus preventing a shock which might occur should the tubing 10 drop the full distance to the disc P^{11}. In order to permit the making of various lengths of flares, the gauging rod P^{17} may be inserted to various distances in the gauging tube P^{10} by releasing the set screw collar P^{18}, a scale P^{26} being laid off on the gauging rod P^{17} to facilitate the proper adjustment of the rod P^{17} relative to the tube P^{10}. The length of the rod P^{17} inserted in the tube P^{10} determines the distance the tube P^{10} will be lowered from the raised position of Fig. 6 and so permits the length of the flare which will be cut off to be regulated at this position. The short ends of tubing P^{27} are removed from the apparatus by an air jet P^{28} (Figs. 1 and 6) supported in the standard N^{11} which directs a stream of air upon the tubing 10 when the gauging tube P^{10} is in a lowered position, the short end of tubing 10 is thus blown off the disc P^{11} into a chute P^{29} (Fig. 1) which delivers it to a suitable container P^{30} carried on the base 22.

To sum up the operation of the mechanisms at position M on the apparatus, when the gauged glass tubing 10 is advanced from the position M the gauging tube P^{10} is automatically raised until the set screw collar P^{18} strikes the arm P^{16}. The succeeding chuck A is indexed into place. The rod N^{10} is raised to lift the chuck arm A^{26} and so open the chuck A. With the flange K^{10} of the tubing 10 resting on the disc P^{11}, the tube P^{10} is lowered to gauge the length of flare which will be cut off at a succeeding position. The rod N^{10} is then lowered and the chuck A is thereby automatically closed. The tubing 10 is then ready to be advanced to the cutting off position.

While we have described a specific machine embodying our invention, we do not wish to be limited thereto as modifications thereof will readily suggest themselves to those skilled in the art.

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

1. An apparatus for flanging a glass tube comprising means for holding said tube, means for rotating said holding means, means for fusing an end of said tube, means for flanging said end, and means for cutting off a section of the tube including the flanged portion without substantially narrowing the passage therethrough.

2. An apparatus for forming a plurality of flares from a length of glass tubing comprising a holder for said tubing, means for fusing an end of said tube, means for flanging said end, means for cutting off a section of said tube including the flare without substantially narrowing the passage therethrough, and means for then advancing said tube in said holder to permit another flanging operation thereon.

3. An apparatus for forming a plurality of flares from a length of glass tubing comprising a carrier supporting a plurality of holders each adapted to receive a length of glass tubing, means for rotating said carrier step by step, a fusing means, a flanging means, and means for severing a section of tubing comprising a flange without substantially narrowing the passage therethrough, all disposed in the path of travel of the ends of said tubing, and means whereby all of said means are caused to operate in a predetermined sequence.

4. An apparatus for forming a plurality of flares from a length of glass tubing comprising a carrier supporting a plurality of substantially vertically disposed holders each adapted to receive a length of glass tubing, means for rotating said carrier step by step, a fusing means, a flanging means, and means for severing a section of tubing comprising a flange without substantially narrowing the passage therethrough, all disposed in the path of travel of the ends of said tubing, and means whereby all of said means are caused to operate in a predetermined sequence.

5. An apparatus for forming a plurality of flares from a length of glass tubing comprising a carrier supporting a plurality of holders each adapted to receive a length of glass tubing, means for rotating said carrier step by step, means for rotating said holders, a fusing means, a flanging means, and means for severing a section of tubing comprising a flange without substantially narrowing the passage therethrough, all disposed in the path of travel of the ends of said tubing, and means whereby all of said means are caused to operate in a predetermined sequence.

6. An apparatus for forming a plurality of flares from a length of glass tubing comprising a carrier supporting a plurality of holders each adapted to receive a length of glass tubing, means for rotating said carrier step by step, a fusing means, a flanging means comprising a pencil and rotating means therefor, and means for severing a section of tubing comprising a flange without substantially narrowing the passage therethrough, all disposed in the path of travel of the ends of said tubing, and means whereby all of said means are caused to operate in a predetermined sequence.

7. In a device for flanging glass tubes, the combination of a support, a flanging pencil pivotally supported thereon, means for advancing said support and for tilting said pencil to cause it to enter a tube longitudinally thereof, means for thereafter causing said pencil to tilt transversely of said tube, and means for rotating said support during the flanging operation.

8. In a device for flanging glass tubes, the combination of a support, a flanging pencil pivotally supported thereon, means for advancing said support and for tilting said pencil to cause it to enter a tube longitudinally thereof, means for thereafter causing said pencil to tilt transversely of said tube, a stripping means for removing glass which may lodge on said pencil.

9. In a device for flanging glass tubes, the combination of a support, a flanging pencil pivotally supported thereon, means for advancing said support and for tilting said pencil to cause it to enter a tube longitudinally thereof, means for thereafter causing said pencil to tilt transversely of said tube, means for retracting said support, means operated during said retraction for stripping lodged tubing from said pencil, and means for rotating said support during the flanging operation.

10. An automatic flare making machine comprising a rotatable carrier, means for intermittently rotating said carrier, a plurality of rotatable chucks for holding glass tubing on said carrier, means for rotating said chucks, means for fusing an end of said glass tubing, flanging mechanism for flanging the fused end of said glass tubing, means for bringing said flanging mechanism into engagement with said fused end, means for releasing each of said chucks to feed the said tubing therethrough, means for receiving said tubing to gauge the amount thereof fed through said holder, means for advancing said receiving means toward said tubing substantially at the time of release to prevent shock thereto, means for returning said receiving means to the gauging position, means for severing said flanged

end from said tubing, and means for causing the operation of the several aforesaid mechanisms in a predetermined sequence and for predetermined intervals.

11. In a flanging machine for glass tubing, the combination of a plurality of holders each adapted to support a length of glass tubing in a substantially vertical position with an end thereof projecting from said holder, a fusing means, a flanging means comprising a pencil normally disposed in a substantially vertical position and pivotally mounted on a support, a carrier for said holders, a driving means for advancing said carrier and bringing the ends of each of said lengths of tubing successively to said fusing means and then to said flanging means, and means operating in proper timed relation to said driving means for thereafter reciprocating said support to cause said pencil to enter said tube end and to thereafter swing toward the horizontal.

In witness whereof, we have hereunto set our hands this 1st day of July, 1921.

FRANCIS J. RIPPL.
FRANK J. MALLOY.