Aug. 29, 1961 H. W. ROEBER 2,998,052

APPARATUS FOR APPLYING LEAVES OF ELECTRON EMISSIVE MATERIAL TO METALLIC CATHODE BASES

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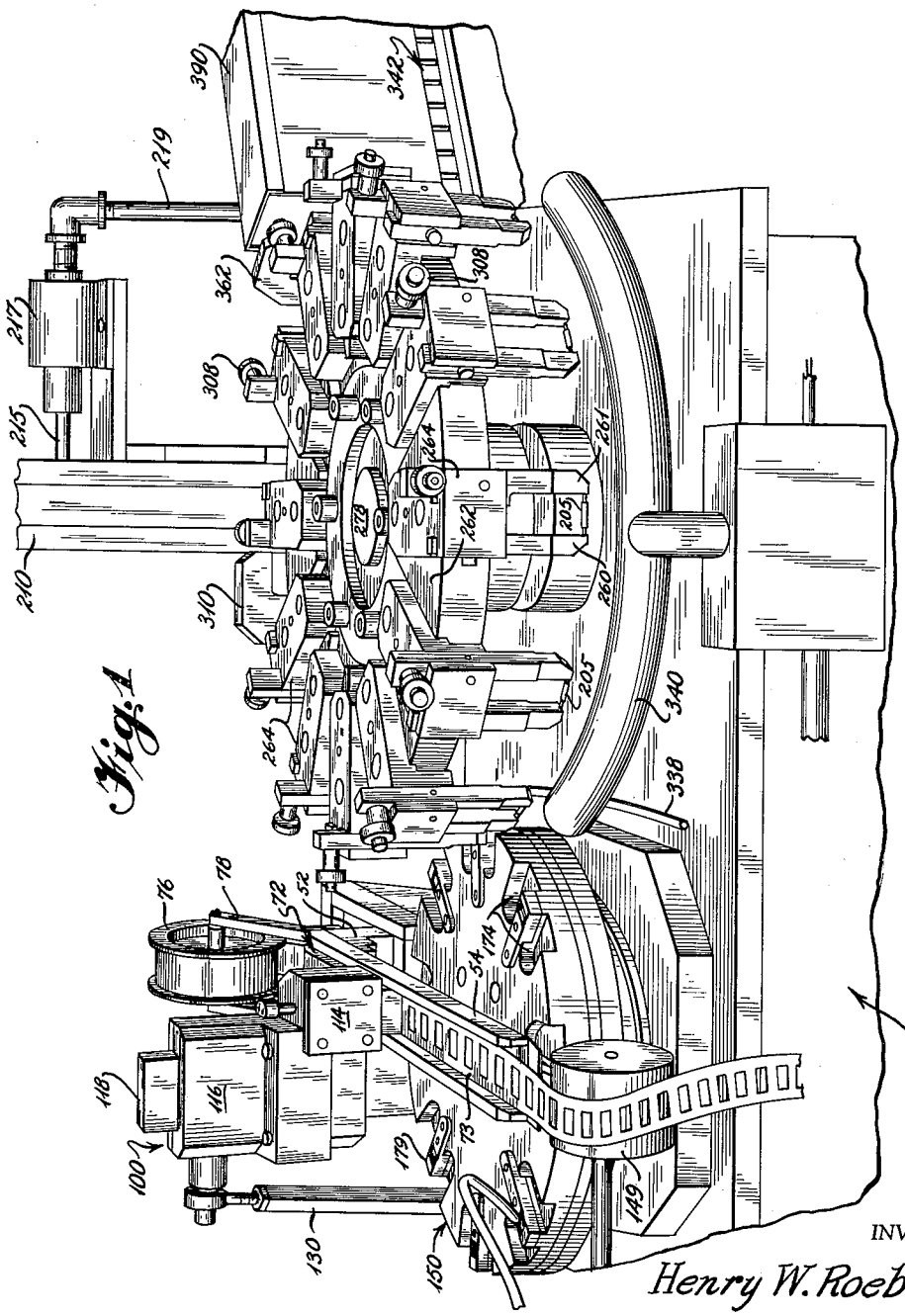


Fig. 1

INVENTOR

Henry W. Roeber

BY Michael Henry,

ATTORNEY

Aug. 29, 1961 H. W. ROEBER 2,998,052

APPARATUS FOR APPLYING LEAVES OF ELECTRON EMISSIVE MATERIAL TO METALLIC CATHODE BASES

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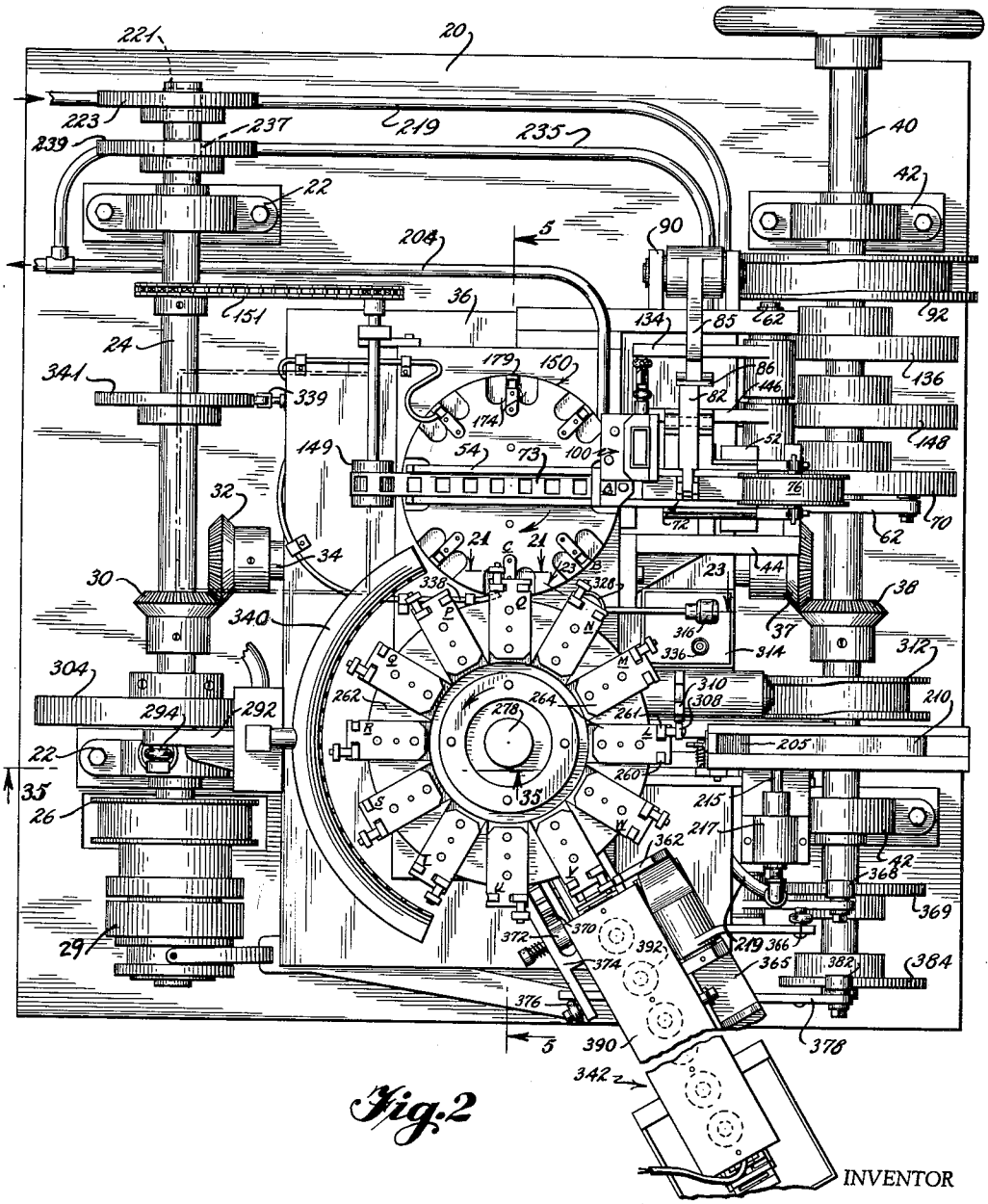


Fig. 2

INVENTOR

Henry W. Roeber

BY Michael Hertz,

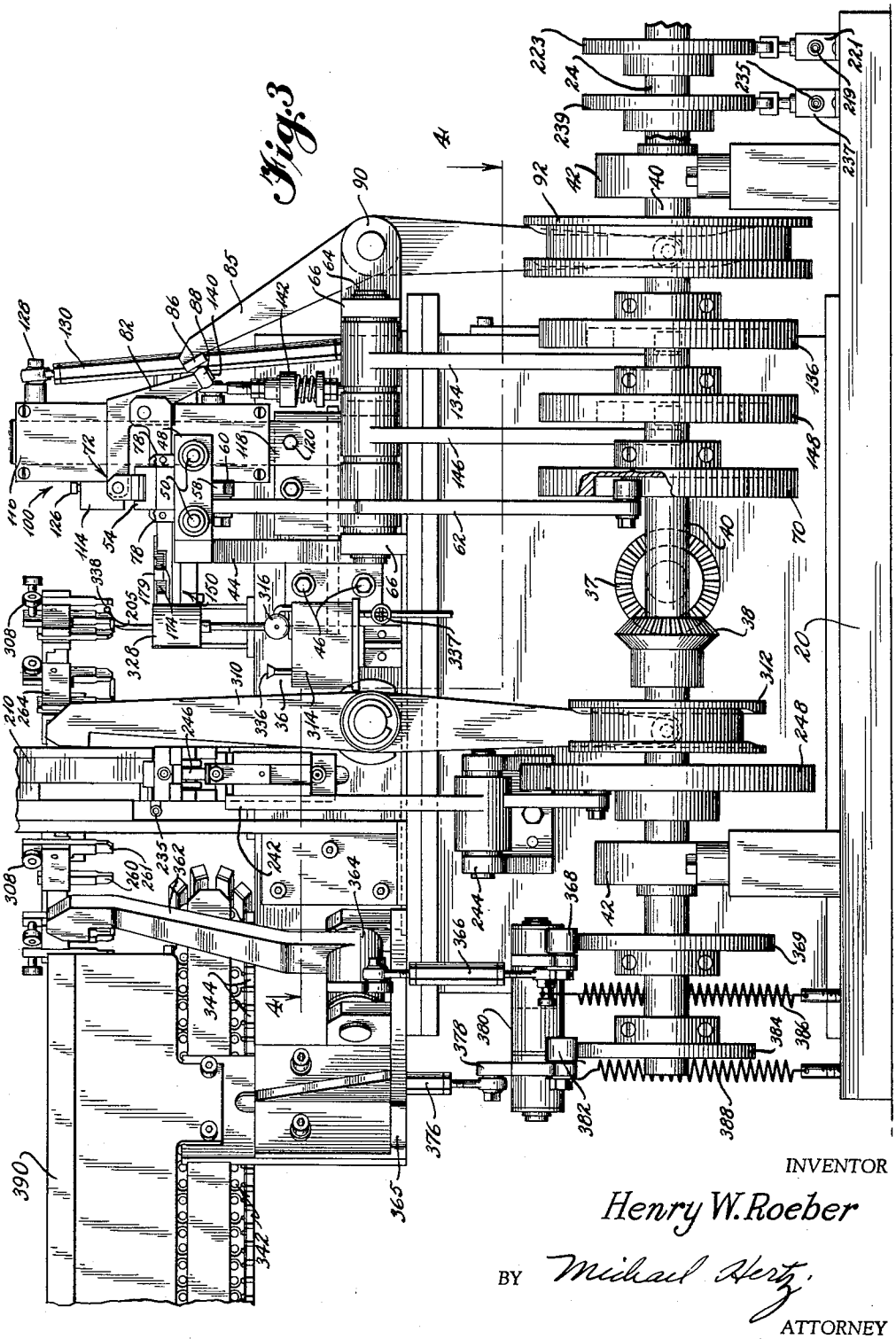
ATTORNEY

Aug. 29, 1961 H. W. ROEBER 2,998,052

APPARATUS FOR APPLYING LEAVES OF ELECTRON EMISSIVE MATERIAL TO METALLIC CATHODE BASES

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Fig. 3



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Aug. 29, 1961 H. W. ROEBER 2,998,052

APPARATUS FOR APPLYING LEAVES OF ELECTRON EMISSIVE MATERIAL TO METALLIC CATHODE BASES

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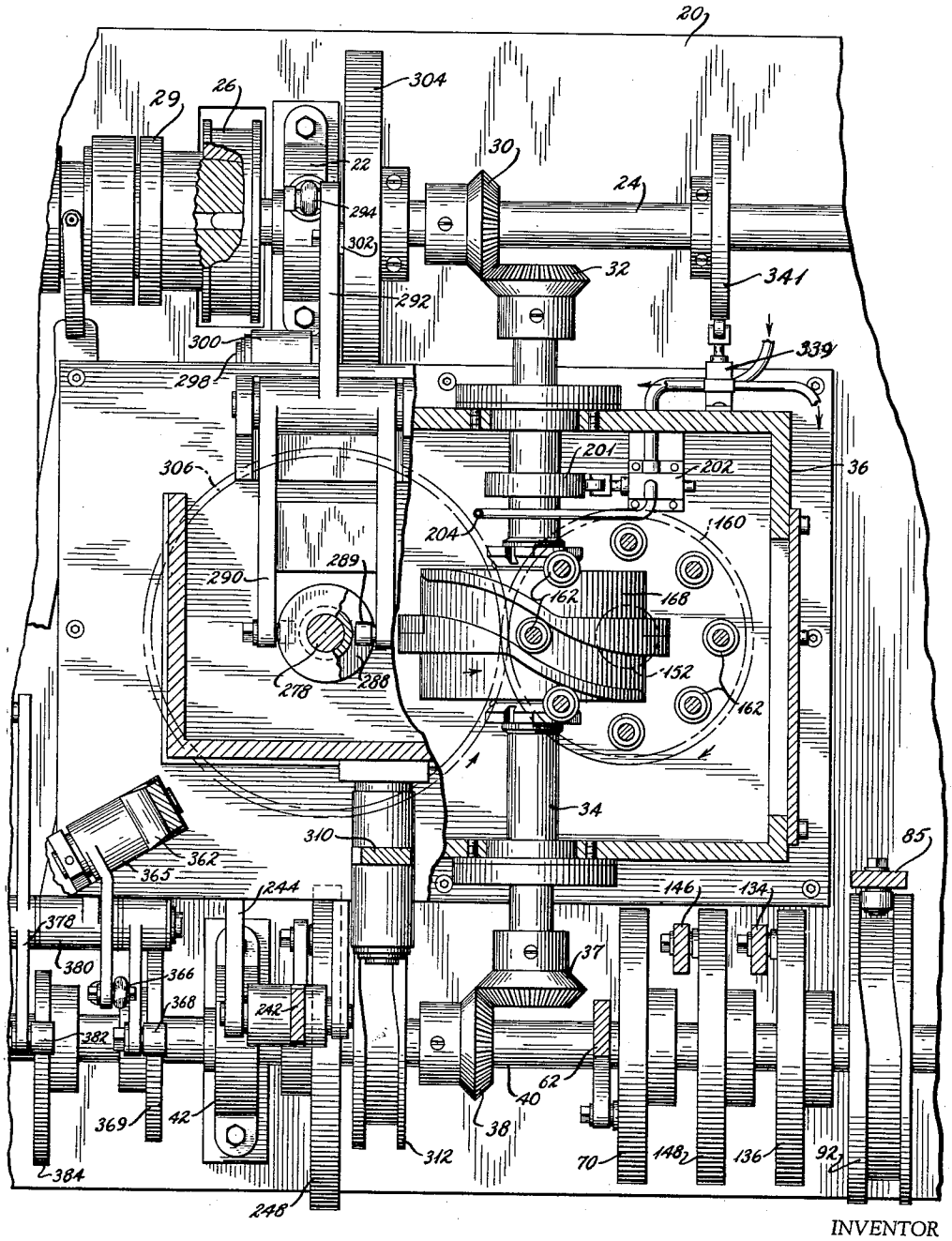


Fig. 4

INVENTOR

Henry W. Roeber

BY Michael Hertz,

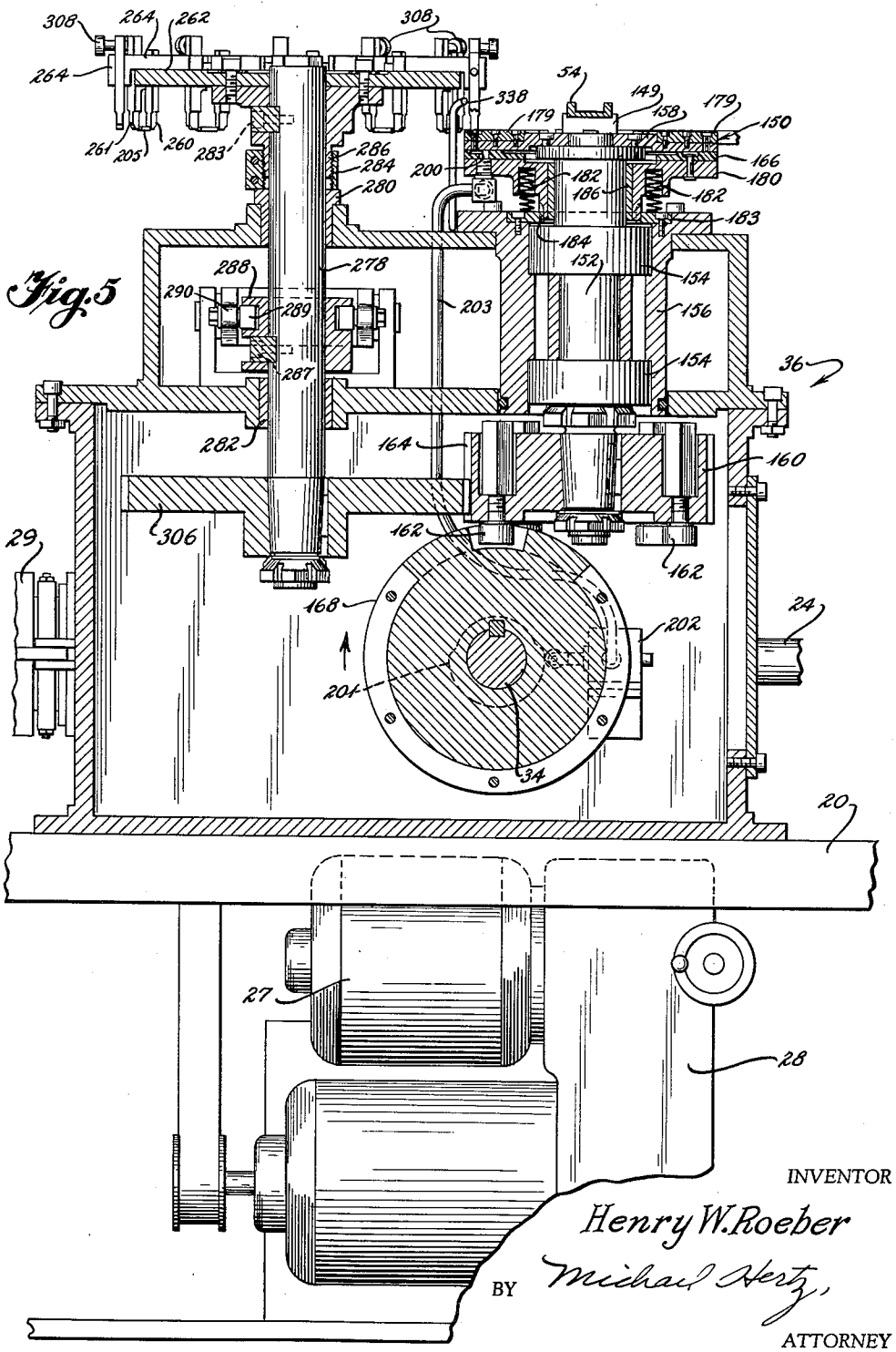
ATTORNEY

Aug. 29, 1961 H. W. ROEBER 2,998,052

APPARATUS FOR APPLYING LEAVES OF ELECTRON EMISSIVE MATERIAL TO METALLIC CATHODE BASES

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Fig. 5



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BY Michael Hertz,

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Aug. 29, 1961 H. W. ROEBER 2,998,052

APPARATUS FOR APPLYING LEAVES OF ELECTRON EMISSIVE MATERIAL TO METALLIC CATHODE BASES

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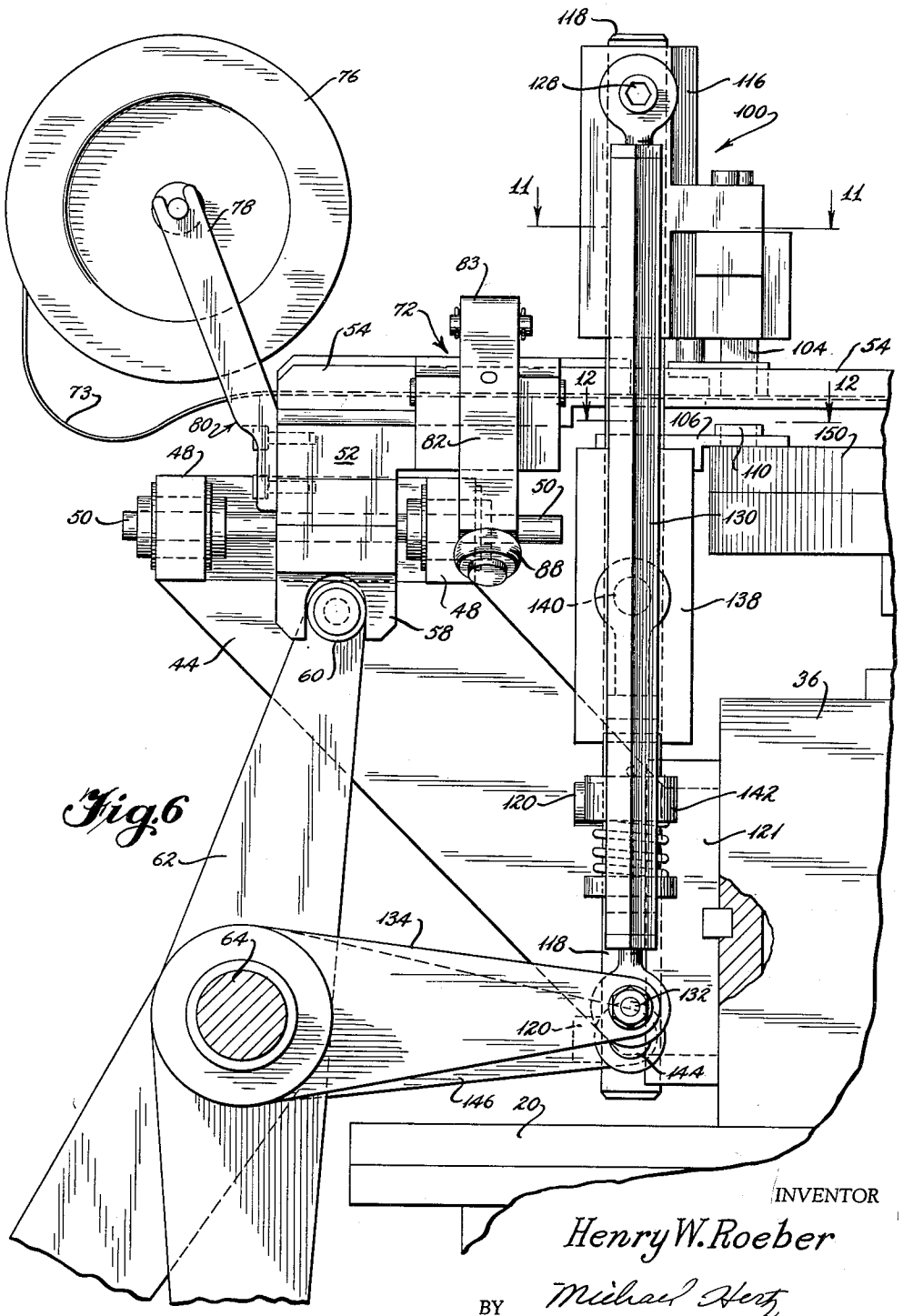


Fig. 6

INVENTOR

Henry W. Roeber

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APPARATUS FOR APPLYING LEAVES OF ELECTRON EMISSIVE MATERIAL TO METALLIC CATHODE BASES

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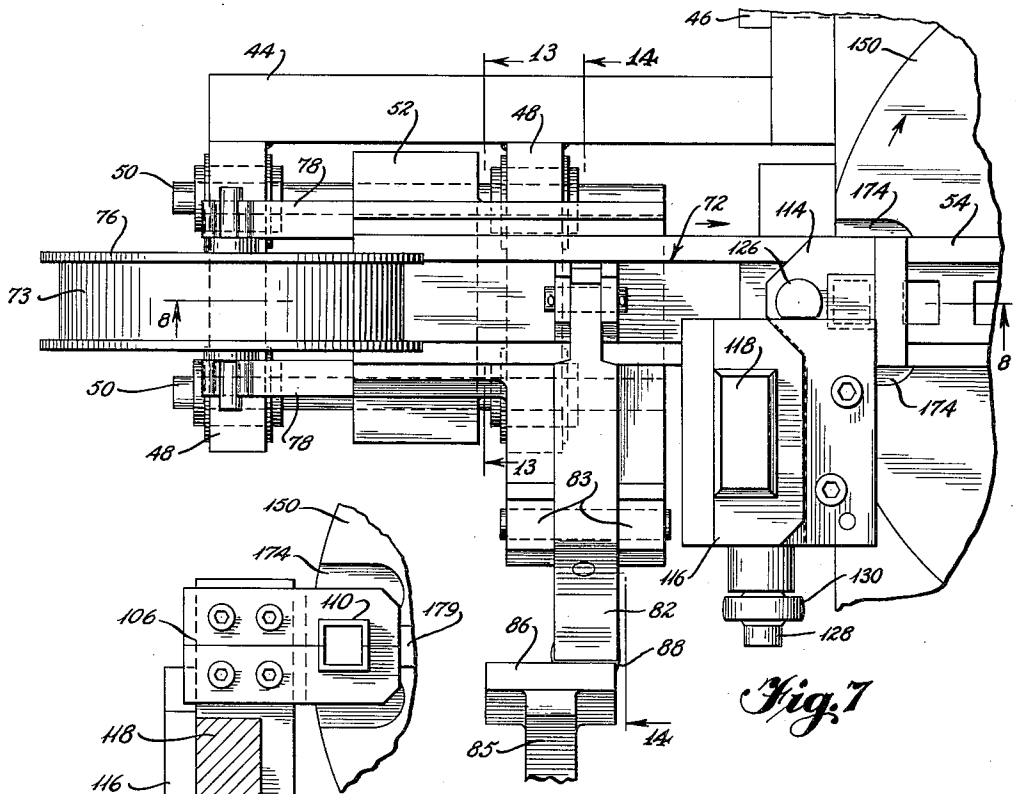


Fig. 7

Fig. 12

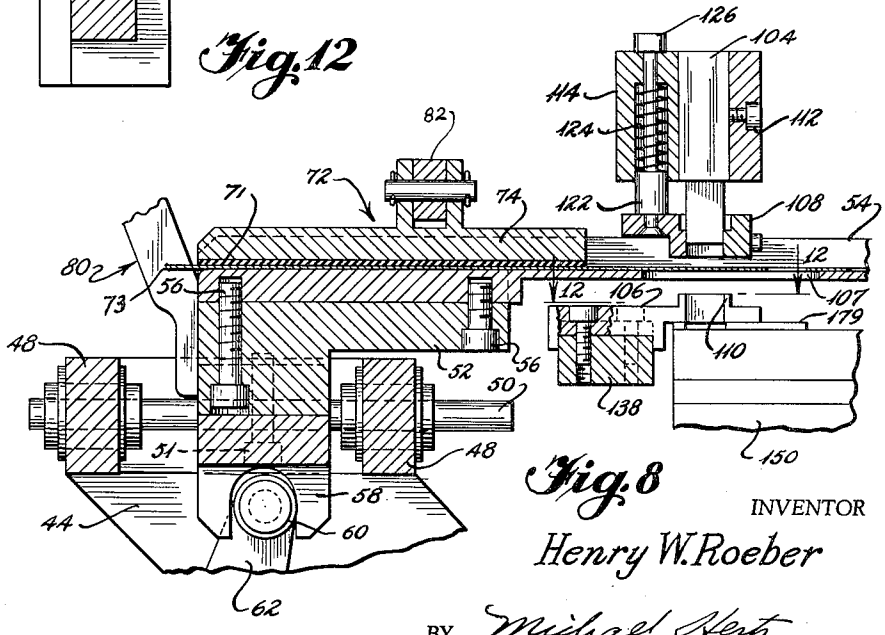


Fig. 8

INVENTOR

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APPARATUS FOR APPLYING LEAVES OF ELECTRON EMISSIVE MATERIAL TO METALLIC CATHODE BASES

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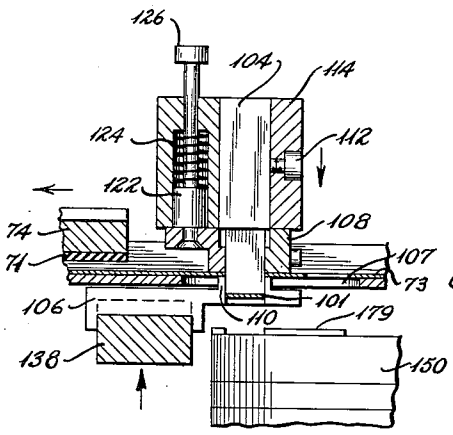


Fig. 9

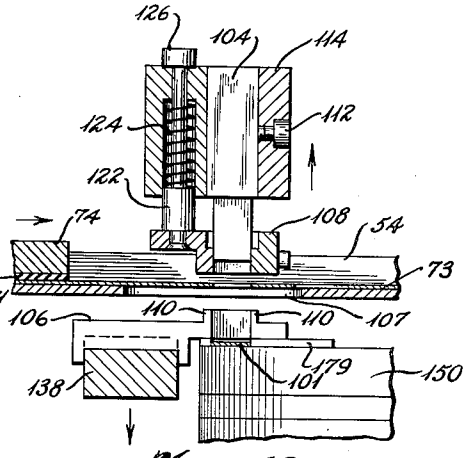


Fig. 10

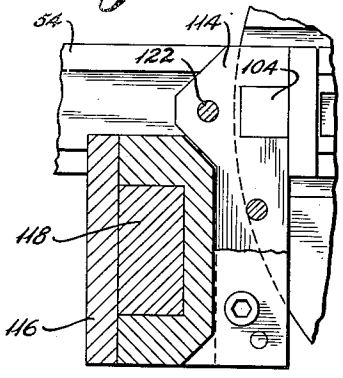


Fig. 11

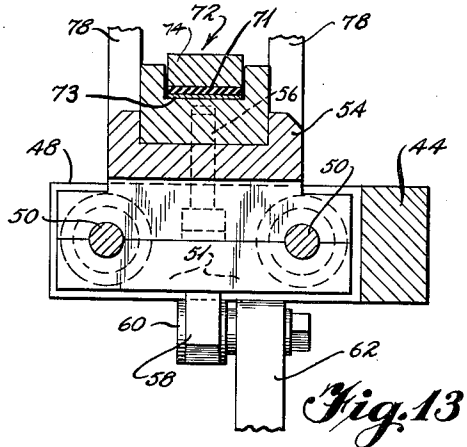


Fig. 13

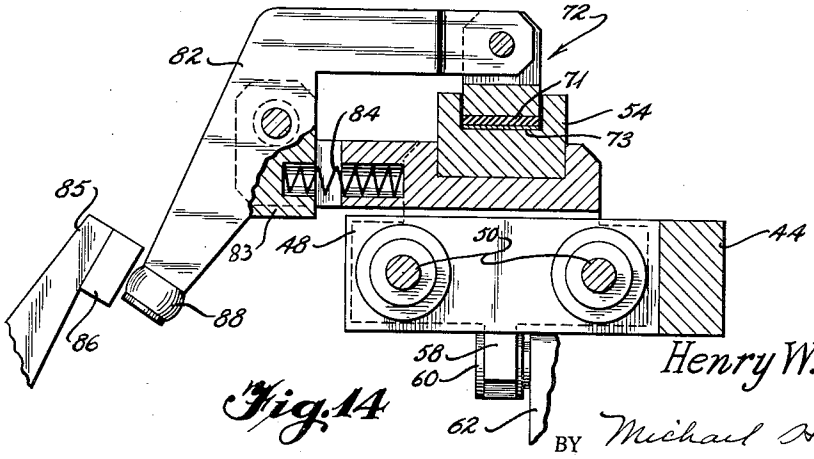


Fig. 14

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APPARATUS FOR APPLYING LEAVES OF ELECTRON EMISSIVE MATERIAL TO METALLIC CATHODE BASES

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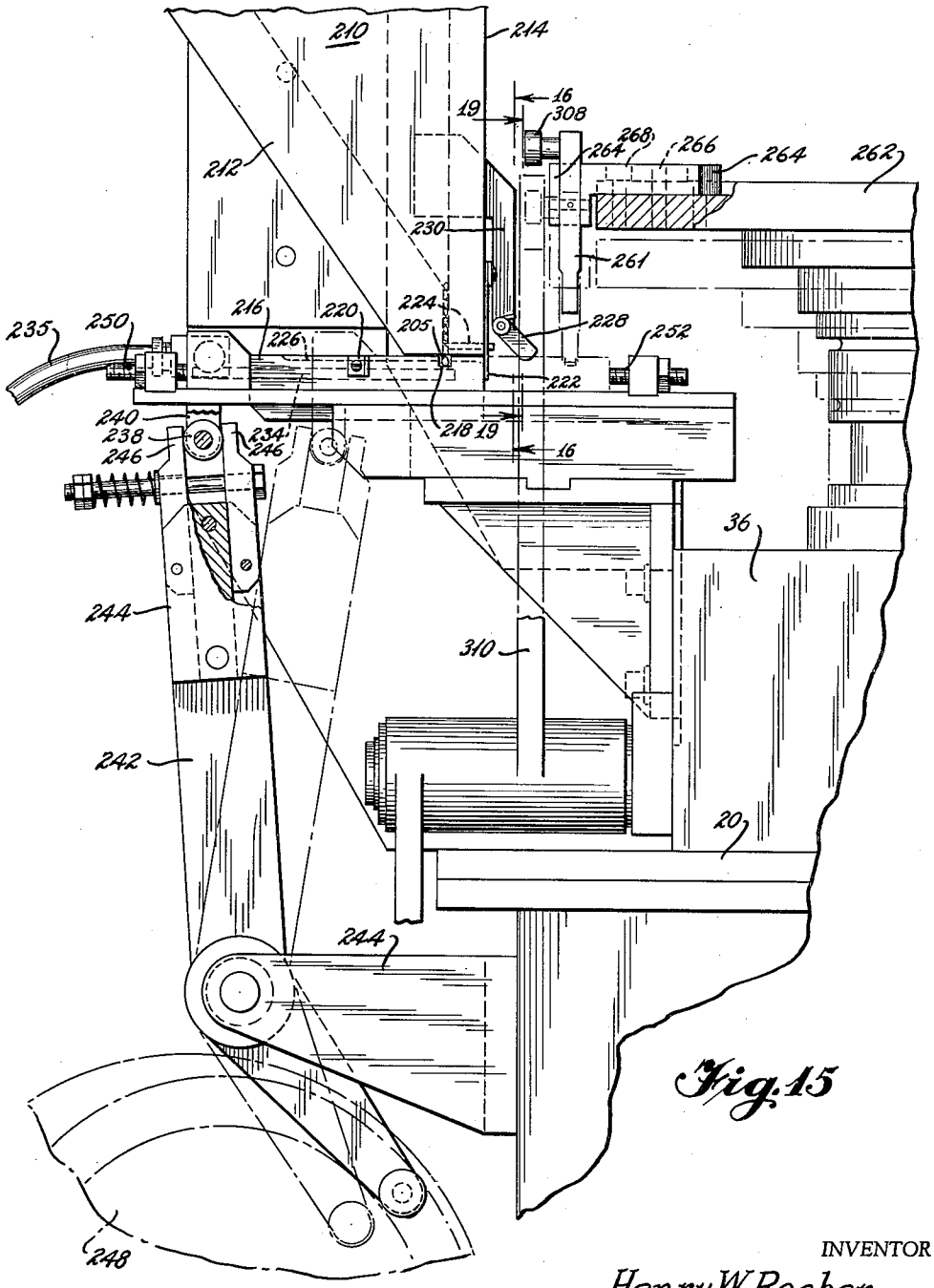


Fig. 15

INVENTOR

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Aug. 29, 1961 H. W. ROEBER 2,998,052

APPARATUS FOR APPLYING LEAVES OF ELECTRON EMISSIVE MATERIAL TO METALLIC CATHODE BASES

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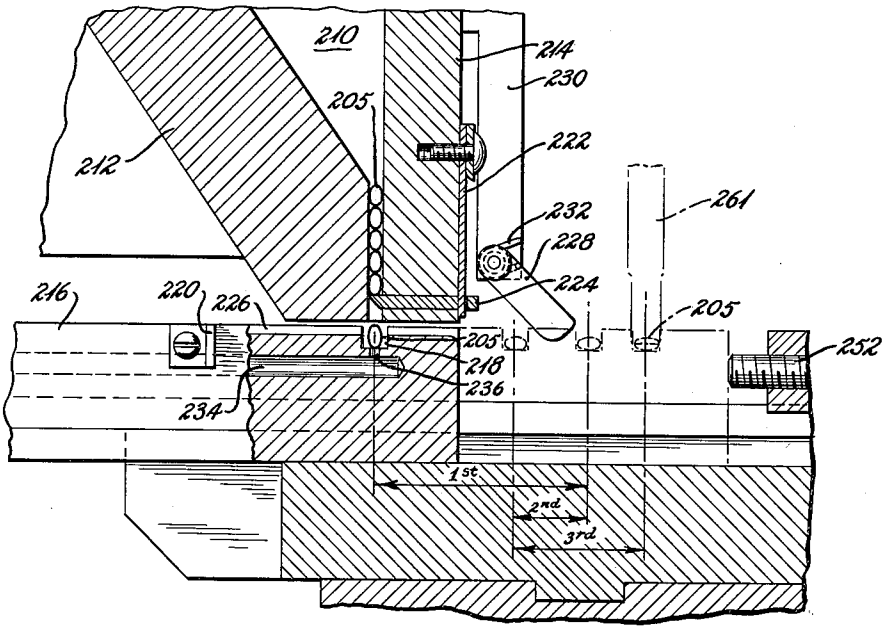


Fig. 17

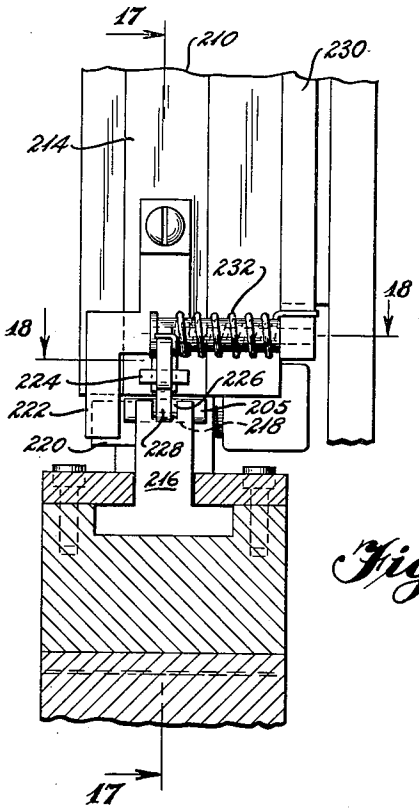


Fig. 16

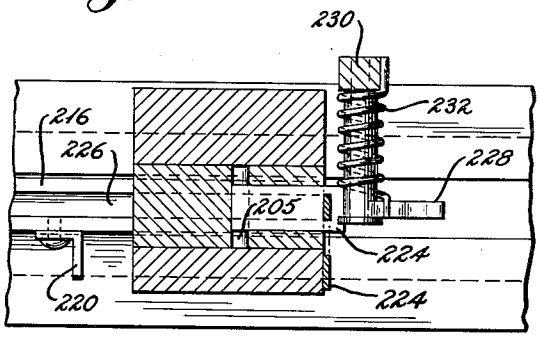


Fig. 18

INVENTOR

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APPARATUS FOR APPLYING LEAVES OF ELECTRON EMISSIVE MATERIAL TO METALLIC CATHODE BASES

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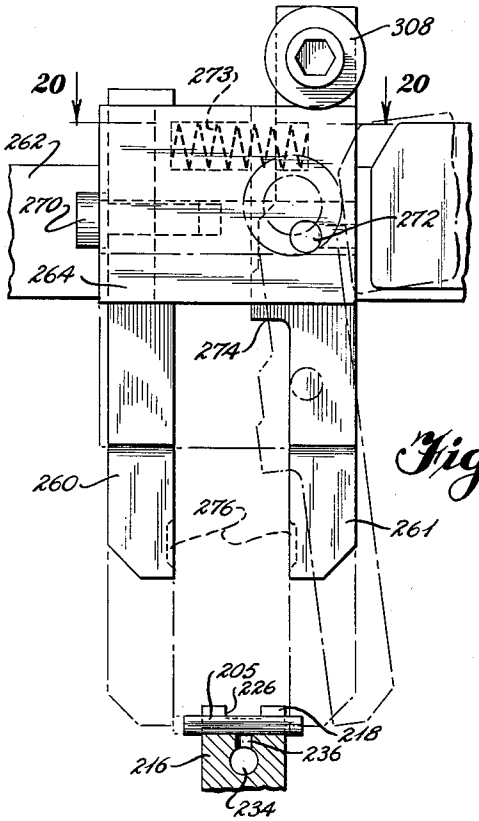


Fig. 19

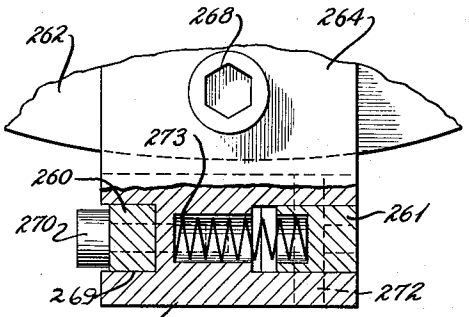


Fig. 20

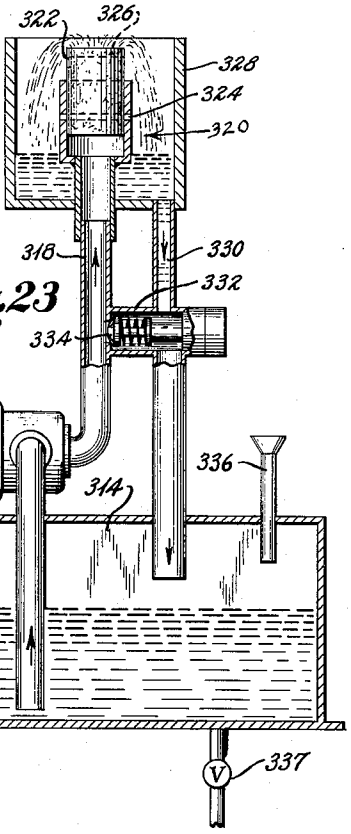


Fig. 23

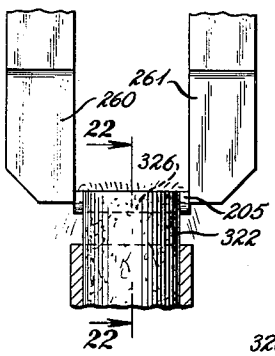


Fig. 21

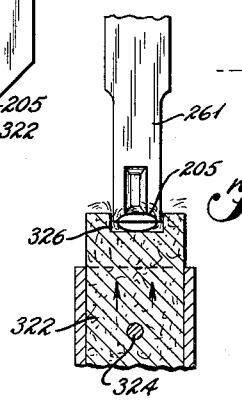


Fig. 22

INVENTOR

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APPARATUS FOR APPLYING LEAVES OF ELECTRON EMISSIVE MATERIAL TO METALLIC CATHODE BASES

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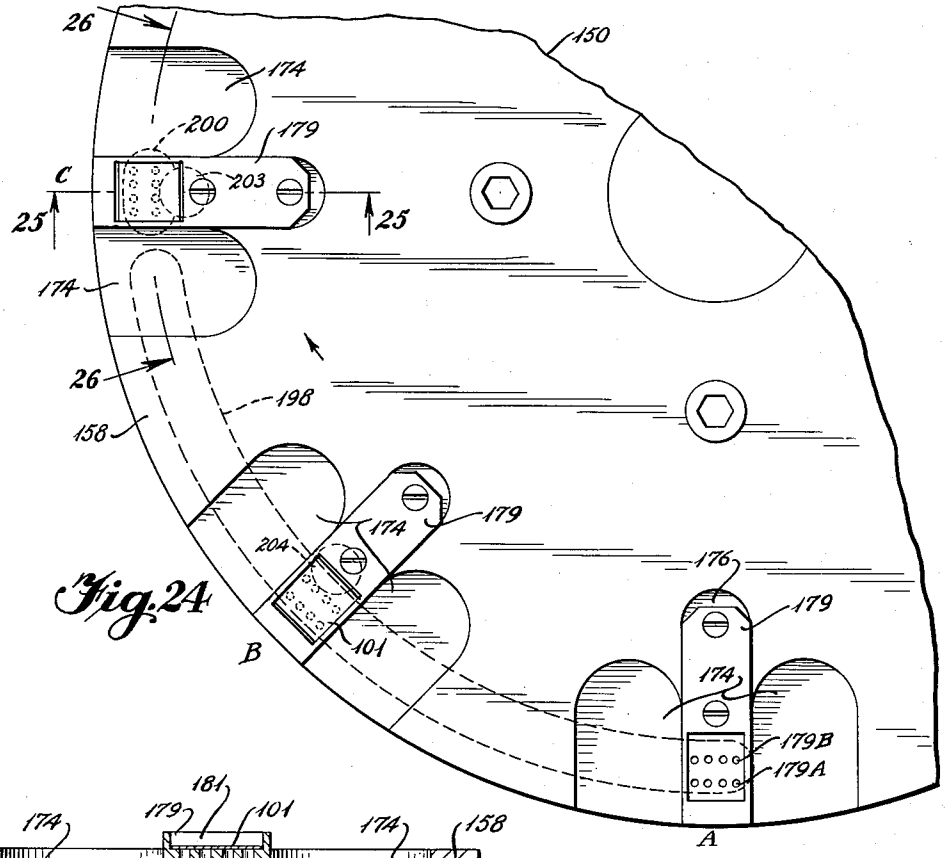


Fig. 24

Fig. 25

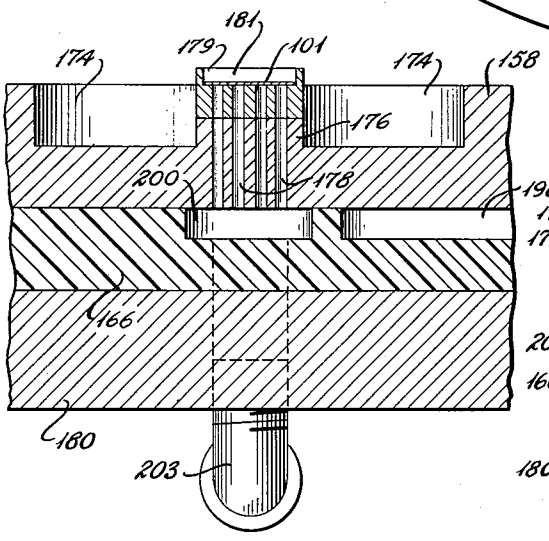
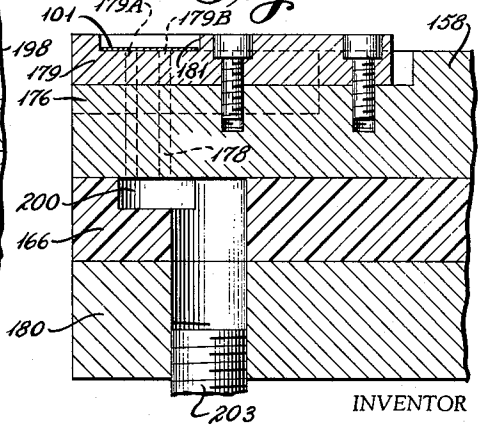


Fig. 26



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APPARATUS FOR APPLYING LEAVES OF ELECTRON EMISSIVE MATERIAL TO METALLIC CATHODE BASES

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Fig. 27

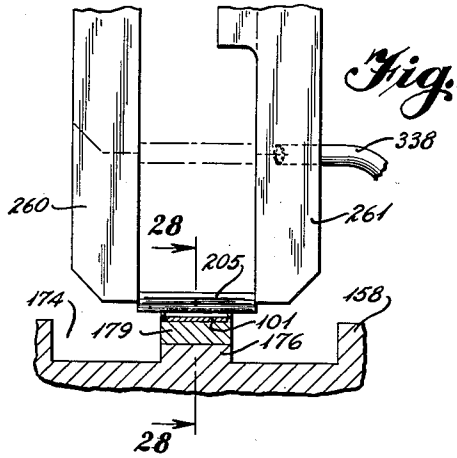


Fig. 28

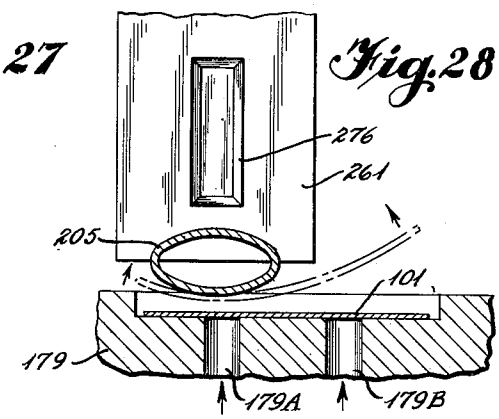
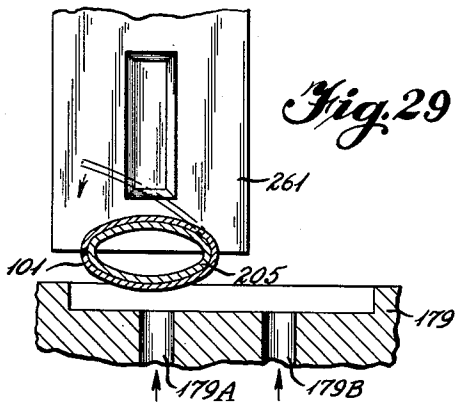


Fig. 29



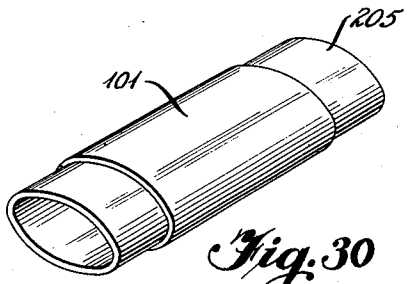


Fig. 30

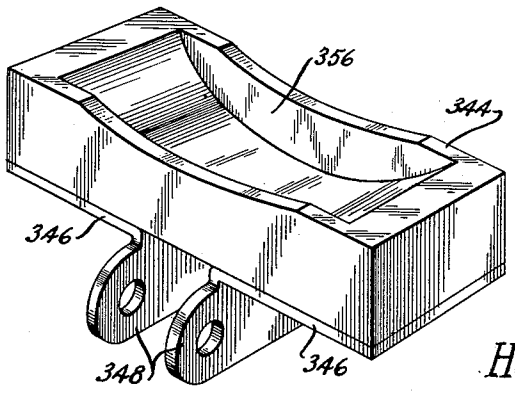


Fig. 34

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APPARATUS FOR APPLYING LEAVES OF ELECTRON EMISSIVE MATERIAL TO METALLIC CATHODE BASES

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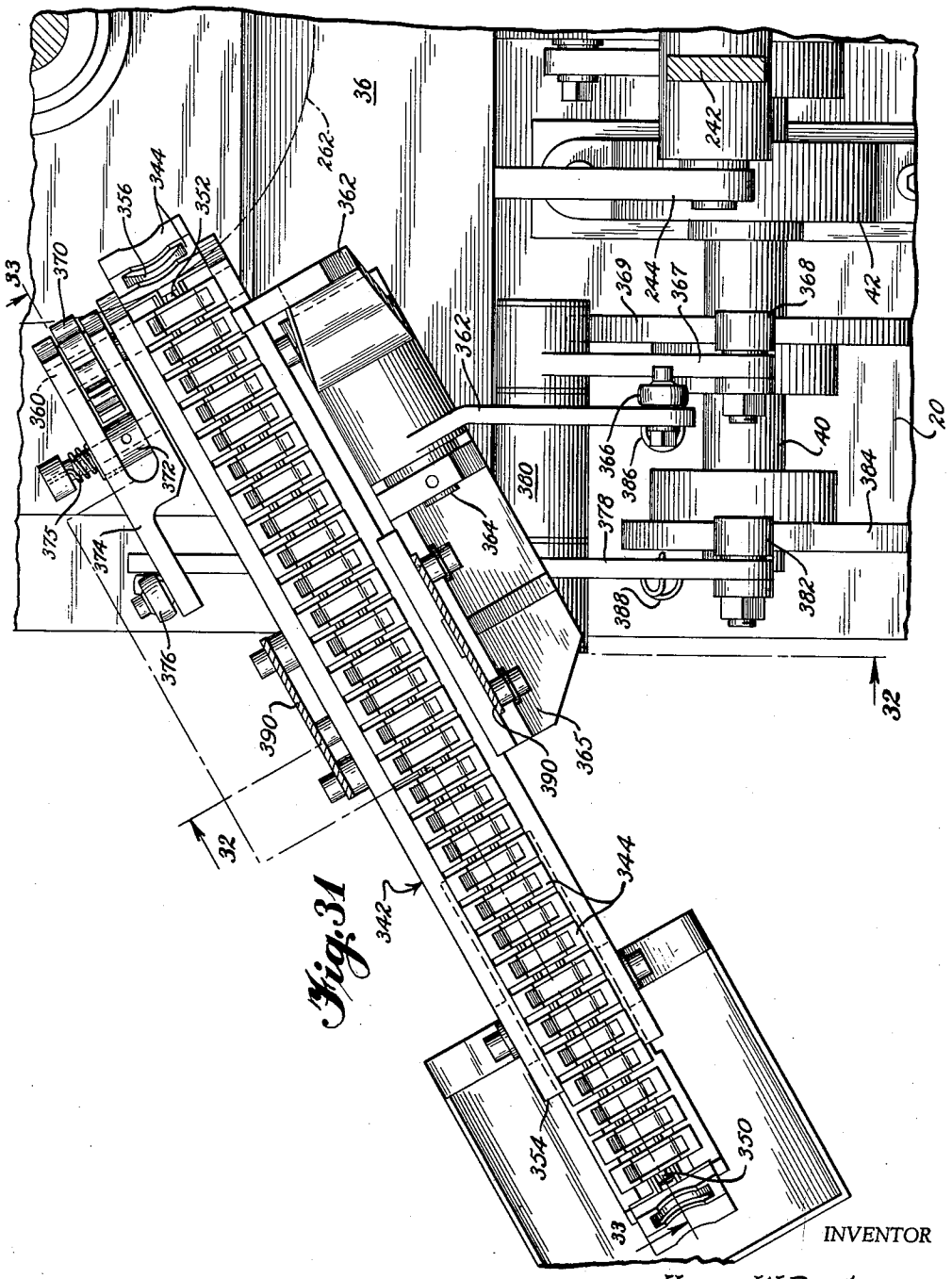


Fig. 31

INVENTOR

Henry W. Roeber

BY Michael Hertz

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Aug. 29, 1961 H. W. ROEBER 2,998,052

APPARATUS FOR APPLYING LEAVES OF ELECTRON EMISSIVE MATERIAL TO METALLIC CATHODE BASES

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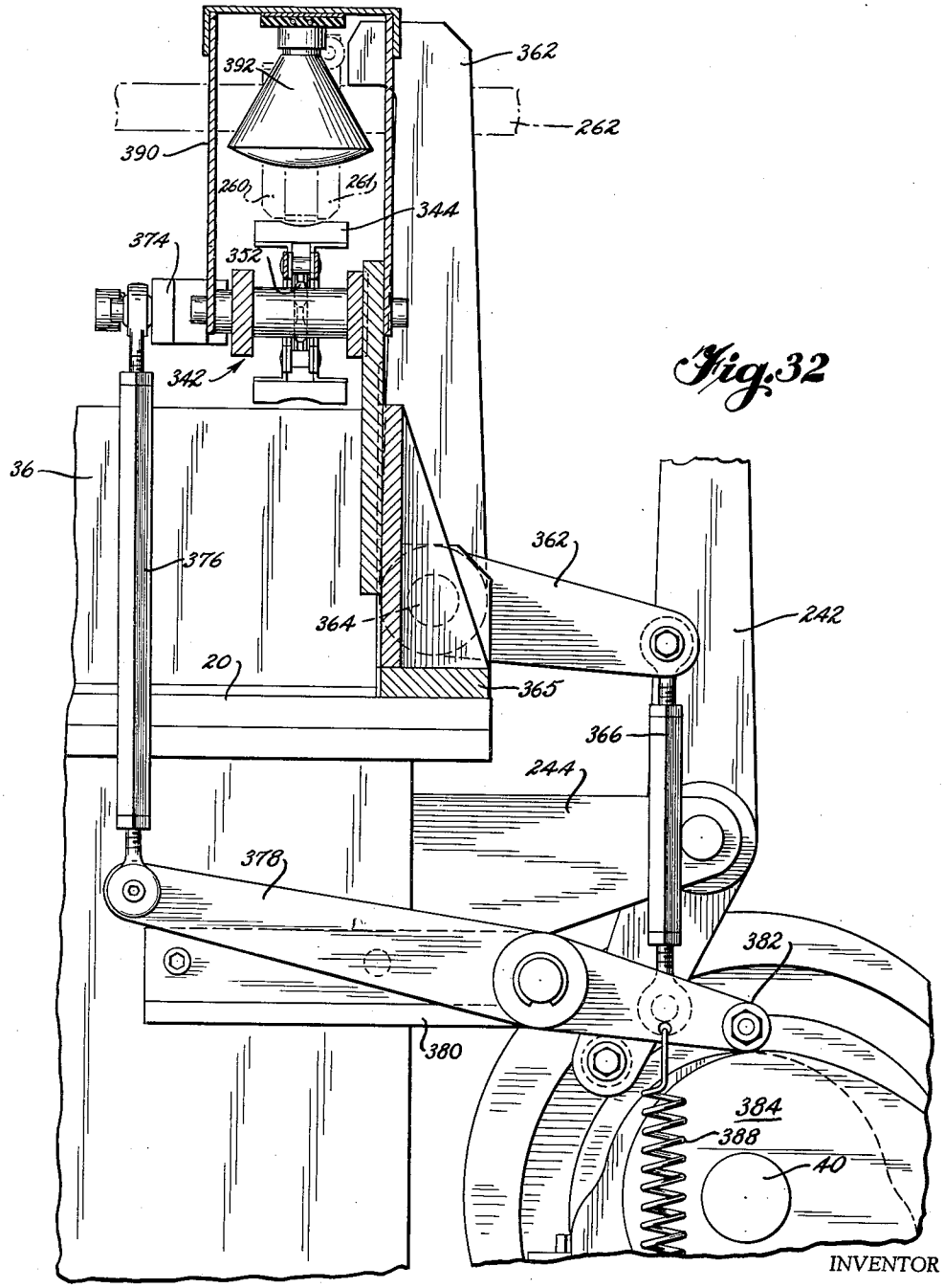


Fig. 32

INVENTOR

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Aug. 29, 1961 H. W. ROEBER 2,998,052

APPARATUS FOR APPLYING LEAVES OF ELECTRON EMISSIVE MATERIAL TO METALLIC CATHODE BASES

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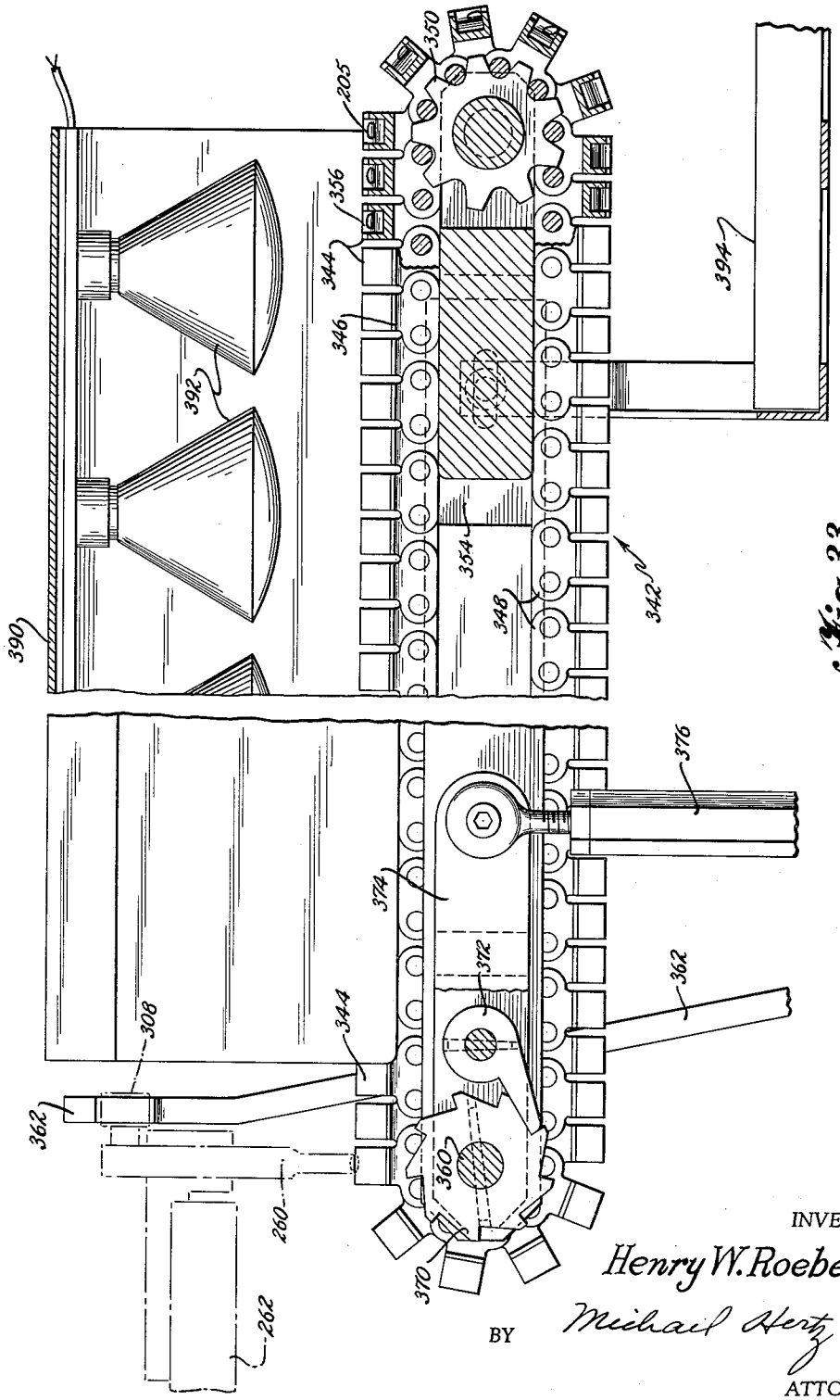


Fig. 33

INVENTOR

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APPARATUS FOR APPLYING LEAVES OF ELECTRON EMISSIVE MATERIAL TO METALLIC CATHODE BASES

Filed June 20, 1958 17 Sheets-Sheet 17

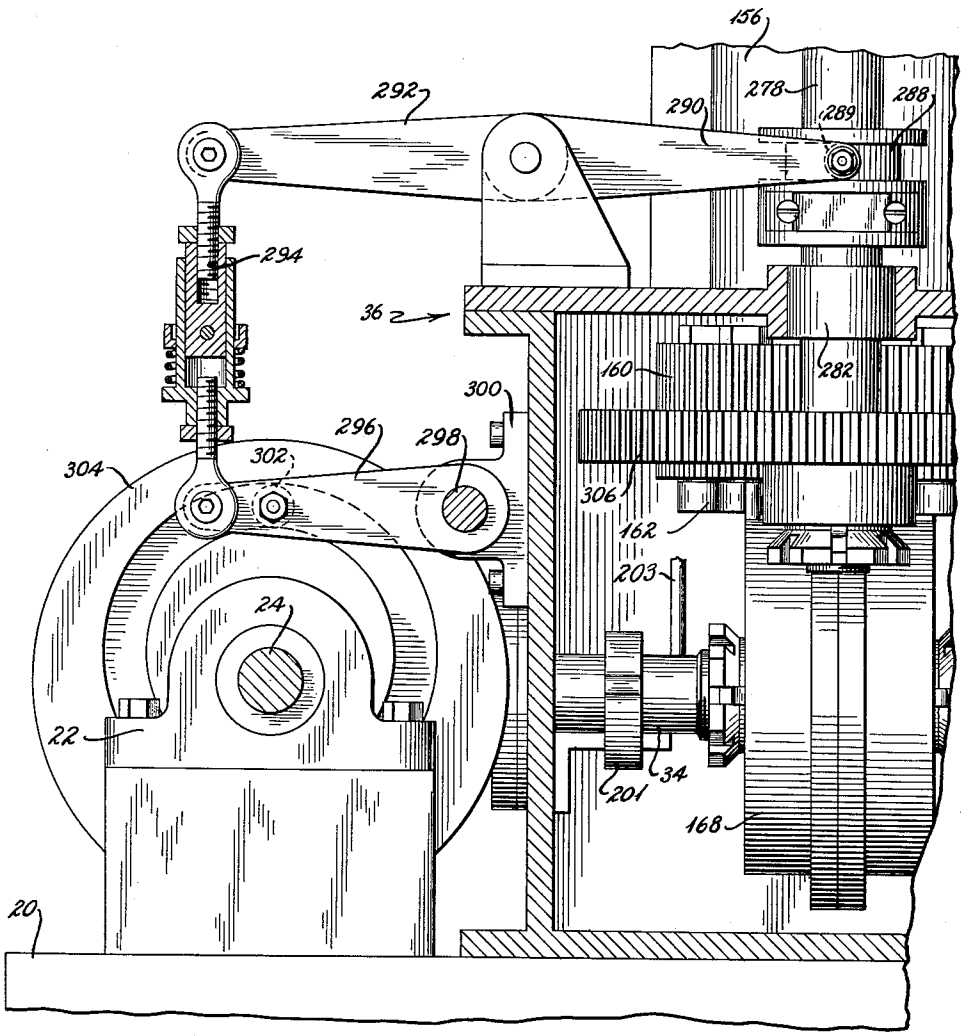


Fig. 35

INVENTOR

Henry W. Roeber

BY Michael Hertz

ATTORNEY

United States Patent Office 2,998,052 Patented Aug. 29, 1961

2,998,052

APPARATUS FOR APPLYING LEAVES OF ELECTRON EMISSIVE MATERIAL TO METALLIC CATHODE BASES

Henry William Roeber, Emporium, Pa., assignor, by mesne assignments, to Sylvania Electric Products Inc., Wilmington, Del., a corporation of Delaware

Filed June 20, 1958, Ser. No. 743,355
20 Claims. (Cl. 154—1.8)

This invention relates to means for applying leaves to bases, for example, leaves of electron emissive material to metallic cathode base materials to form cathodes used in the manufacture of electronic tubes.

In the manufacture of electron tubes it is necessary to coat a cathode base with an electron emissive material. In a common form of such tube the emissive material is in the form of a coating about a hollow metallic sleeve which may have any cross section e.g., cylindrical, oval or rectangular. These coatings in accordance with standard practice are applied by utilizing a spraying technique wherein the sleeves are all aligned and placed in a rack or framework such as disclosed in the patent to Morrs 2,786,444 and passed back and forth in front of nozzles which spray the emissive material on the sleeve, with the rack, at times, reversely facing the nozzles to ensure spraying both sides of the sleeves.

This is a messy operation with much waste of material since only a portion of the spray strikes the cathode sleeves and obviously the coating is not uniform about the sleeves or uniform with respect to separate batches of sleeves being coated.

Where the emissive material is precast into a uniform strip, it can be formed without waste and the strip can be cut up into leaves of a size just sufficient to wrap around the sleeve once, thus ensuring an even coating around the sleeve.

It is a specific object of this invention to provide automatic means to apply such a precast preformed leaf of emissive cathode material onto a metallic base.

It is a further object of the invention to apply the leaf evenly and in a uniform manner to successive bases by causing the leaf to wrap itself around and adhere to the base after an initial contact between the leaf and base has been attained.

These and other objects will become apparent after reading the following description when taken in conjunction with the accompanying drawings in which:

FIG. 1 is a perspective view of the entire cathode sleeve coating machine.

FIG. 2 is a plan view of the turret portion of the machine.

FIG. 3 is an elevation of the machine from the material feed side of the machine and looking, from the right, at the machine of FIG. 2.

FIG. 4 is a horizontal section taken on the line 4—4 of FIG. 3.

FIG. 5 is a vertical section taken along the line 5—5 of FIG. 2.

FIG. 6 is a side elevation of a portion of the machine showing the mechanism for feeding cathode emissive material to the machine.

FIG. 7 is a plan view of the same portion of the machine.

FIG. 8 is a vertical section on the line 8—8 of FIG. 7.

FIGS. 9 and 10 show two positions of the emissive material stamping out means together with the shifted positions of related parts.

FIG. 11 is a section taken on the line 11—11 of FIG. 6.

FIG. 12 is a section taken along the line 12—12 of FIG. 6.

FIG. 13 is a vertical section taken along the line 13—13 of FIG. 7.

FIG. 14 is a vertical section taken along the line 14—14 of FIG. 7.

FIG. 15 is a side elevation of the cathode sleeve feed mechanism.

FIG. 16 is an enlarged front elevational view of a portion of the cathode sleeve hopper.

FIG. 17 is a vertical section taken along the line 17—17 of FIG. 16.

FIG. 18 is a horizontal section taken along the line 18—18 of FIG. 16.

FIG. 19 is an elevational view of the cathode sleeve pick up fingers as viewed along the line 19—19 of FIG. 15.

FIG. 20 is a horizontal section on the line 20—20 of FIG. 19.

FIG. 21 is a section taken along the line 21—21 of FIG. 2 showing a fragmentary portion of the solvent applying mechanism and associated finger held sleeve.

FIG. 22 is a vertical section on the line 22—22 of FIG. 21.

FIG. 23 is a diagram view of the solvent tank, pump, and associated ports.

FIG. 24 is a fragmentary plan view of the emissive material supporting turret.

FIG. 25 is a section taken along the line 25—25 of FIG. 24.

FIG. 26 is a section taken along the line 26—26 of FIG. 24.

FIG. 27 is a vertical section taken along the line 27—27 of FIG. 2.

FIG. 28 is a vertical section taken along the line 28—28 of FIG. 27 showing the emissive material just about to be wrapped about the cathode sleeve.

FIG. 29 is a similar view showing the material in the final stage of wrapping.

FIG. 30 is a perspective view of the fully wrapped cathode sleeve.

FIG. 31 is a plan view of the take-off conveyor with a top heating unit removed.

FIG. 32 is a section on the line 32—32 of FIG. 31.

FIG. 33 is another section on the line 33—33 of FIG. 31 showing drive mechanism for the conveyor.

FIG. 34 is a perspective view of one of the cathode sleeve receptacles on the conveyor, and

FIG. 35 is a section on the line 35—35 of FIG. 2.

In general, the machine specifically illustrated and which carries out the principles of this invention comprises means for stamping or punching out from a strip of emissive material which has a soluble binder, a leaf of such material, depositing each leaf so stamped out onto a turret, supplying cathode bases or sleeves to a conveyor, orientating the sleeves on the conveyor, picking up the sleeves from off the conveyor by an indexible carrier, applying a solvent for the binder in the emissive coating to the sleeves while held in the carrier, bringing successive sleeves on the carrier and the successive punched out leaves as they are transported on the turret into registration with each other and effecting wrapping of the leaf about the sleeve on the carrier as each carrier reaches registration position. In addition, the machine also applies a drying gas such as hot drying air to the coated sleeves and places the dried coated sleeves on a delivery conveyor where, if desired, they may be further dried.

Referring to the drawings in greater detail, at 20, see FIGS. 2 and 3, there is a table top or base having upstanding bearings 22 supporting a drive shaft 24 having a pulley 26 fixed thereon and driven by any suitable electric motor 27, see FIG. 5, through a Reeves transmission 28, supported below the table top.

The shaft has cams thereon which will be described in due course and is driven from the transmission through a clutch **29**. Also fixed on this shaft is a bevel gear **30** meshing with a second bevel gear **32** fast on a cross shaft **34** passing through a support housing **36**. The other end of the cross shaft has affixed thereto a bevel gear **37** meshing with a bevel gear **38** fixed on a countershaft **40** supported in bearings **42** and parallel with the shaft **24**. The counter shaft also has a multiplicity of cams thereon which will be described in due course.

Attached to the housing, see FIGS. 3, 6, 7 and 8 is a bracket **44**, as by bolts **46**. The bracket has a pair of parallel spaced guide rod supports **48** in which are slidable a pair of guide rods **50**. Fixed to the guide rods, as by bolts **51** passing through a two part slide carriage **52** tightly embracing the rods is a slide and forming part of the slide is a chute **54**, held to the carriage by bolts **56**. The lower portion of the slide carriage has a bifurcated downward extension **58** to receive the roller **60** of a lever **62** pivoted on a stub shaft **64** supported by brackets **66** on the support housing. The other end of the lever rides in a cam track in the side face of a cam **70** fast on the countershaft **40**. Thus, as the lever is oscillated by the cam **70**, the slide carriage and chute are reciprocated.

Movable with the carriage is a clamping mechanism **72** having a rubber pad base **71**, see FIGS. 8, 13 and 14, for intermittently clamping and releasing a strip of electron emissive material **73** as it is placed in the chute. For this purpose there is provided a clamp block **74** fitting in the chute and movable toward the bottom of the chute to clamp the emissive strip therebetween. Then as the carriage and chute are shifted in one direction, the clamp block, strip and chute will move together. On the reverse movement of the chute the clamp block will have been released so that it and the chute can move backwardly independently of the strip and a new purchase can be obtained on the strip for the next advance movement thereof with the chute The emissive strip is fed from a roll **76** of such material rotatably mounted in upstanding arms **78** of a bracket **80** fastened to the movable carriage **52**. The clamp block is pivoted on the end of a lever **82** in turn pivoted in parallel extensions **83** on the slide carriage and normally spring pressed to clamping position by a spring **84** reacting between the carriage and the lever. The lever **82** is forced to move to a clamp block releasing position by oscillation of a lever **85** with a wide contact plate **86** engaging a roller **88** on the lever **82**. The lever **85**, see FIG. 3, is pivoted in a clevis **90** on the bracket **66** and is worked by a track in the peripheral face of a cam **92** fixed on shaft **40**.

Adverting to FIGS. 6 to 13, a short distance in advance of the clamp mechanism just described is a punch and hollow die set **100** to stamp out leaves **101** (see also FIGS. 27 to 30) from the emissive strip. The punch, rectangular in cross section, is indicated at **104** and the corresponding rectangular hollow die is indicated at **106**. The punch and die operate through a slot **107** in the bottom wall of the chute **54** and a combined stripper pad and clamp **108** assists in the punching out of a leaf from the emissive strip. In the operation of the punch and die and after the strip has been advanced, the die moves upwardly with its neck portion **110** extending through the slot **107** and with the upper edge of the neck portion flush with the upper surface of the lower wall of the chute as in FIG. 9, or just into engagement with the underside of the emissive strip. The stripper pad then clamps the emissive strip between the pad and the top surface of the neck after which the punch approaches the strip and transfers the punched out leaf from the emissive strip, the end of the punch passing completely through the die and almost onto a leaf carrier turret below the chute. For effecting movement of the punch, the same is fastened by a screw **112**, FIG. 8, in a two part stripper support block **114** in turn fastened to a vertical two part sleeve **116**, FIGS. 6 and 7, slidable on a rectangular guide bar **118**. At its lower end the bar is fastened by bolts **120** to a keyed support plate **121** suitably fastened to the housing **36**.

The stripper block, see FIGS. 9 and 10, slidably retains a stripper plunger **122** fastened to the stripper pad **108** and is spring pressed toward the chute by a spring **124** within the block and reacting against the plunger. A head **126** on the plunger engaging the block **114** limits advance movement of the stripper pad. On movement downwardly of the sleeve **116** relative to the guide bar **118**, the stripper pad first engages the emissive strip to hold the same preparatory to a punching out operation. At this time the clamp block **74** is raised and the movable chute **54** and clamp block retract to enable a new bite to be taken by the clamp and chute on the emissive strip. The clamp block and chute organization and the combination of stripper pad and die work in alternation to effect a proper feed of the emissive strip. After the punching out of the leaf from the strip, the sleeve rises but the rise of the stripper pad, by reason of its spring mounting, is delayed, thereby enabling the punch to be withdrawn from the die and strip of emissive material without pulling the strip up with it. Eventually, the head **126** engaging the block **114** raises the pad **108** away from the strip. The die has a small movement downwardly in the transfer of the leaf to the turret below and it is moved downwardly so that the top surface thereof does not interfere with subsequent strip advance.

To reciprocate the punch and stripper pad, the sleeve **116**, see FIG. 6, is provided with a pivot pin **128** coupled by a link **130** to a pin **132** on a lever **134** pivoted on the stub shaft **64**. The lever **134**, see FIG. 3, is operated by a cam **136** fast on shaft **40** and having a groove in its side face in which a follower on the lever rides.

The chute **54**, see FIGS. 1 and 2, extends over an in- also reciprocable on the guide bar **118** and has a pivot pin **140** coupled by a spring telescopic link **142**, of conventional form, with a pivot pin **144** on a lever **146** also pivoted on stub shaft **64** and operated by a cam **148**, FIG. 3, fixed on the shaft **40**. The telescopic link allows for excess movement of parts by the cam after the die itself is arrested in its upward motion.

The chute **54**, see FIGS. 1 and 2, extends over an indexible leaf transfer turret **150** and conducts the remaining strip material to a suitable receptacle placed at the end of the chute. To facilitate strip disposal, a fiber roll **149**, driven by chain gear **151** from the shaft **124**, is mounted on the forward end of the chute.

The turret **150**, see FIG. 5, is mounted on a vertical axis in the housing **36**. It comprises a vertical shaft **152** mounted in antifriction bearings **154** in a sleeve **156** having an eccentric bore and fixed in the housing at predetermined angular relations thereto to vary the lateral position of the axis of the turret with relation to the housing. To the upper end of the shaft is fixed a leaf transfer disc **158** and to the lower end of the shaft is fastened an indexer gear **160** bearing index rollers **162** at its bottom. The indexer gear has long gear teeth **164** extending in the direction of the vertical axis of the turret. Cooperative with the underside of the disc is a ported disc **166** which will be described in greater detail later on. The turret is indexed by means of a cross over cam **168**, see FIG. 4, fixed on the shaft **34**. The indexing arrangement here illustrated is conventional in the art and is described in the patent to Gardner et al. 2,637,144 to which reference may be had for better understanding of the indexing mechanism. Each time the cam **168** rotates one revolution, the turret is indexed one-eighth of a revolution. The upper face of the transfer disc, see FIGS. 1, 2, 24, 25 and 26, is provided with eight pairs of depressions **174** extending radially inward from the periphery, for a purpose to be later described and with a slightly raised land **176** perforated as indicated at **178** inserted between each pair of depressions. On each of

these lands is fitted a plate 179 with two rows of apertures 179A and 179B in communication with the perforations in the lands. When the die 106 is at its lower position adjacent the turret in an indexed position of the turret, suction applied through the perforations 178 will cause the leaf to move against the face of the turret disc and be held there. To assure proper position of the leaf 101 against the plate 179, the plate is recessed as indicated at 181. At another indexed position of the turret air will be blown through these same perforations.

While the leaf transfer disc just described has an indexing motion carrying the lands 176 around in an orbital path, the valve disc 166 (FIG. 5) below it is fixed. The valve disc is fixed on a pressure plate 180, both the disc and plate being spring pressed against the underface of the perforated transfer disc 158 by springs 182 reacting between the plate 180 and a ring 183 secured to the sleeve 156. The ring 183 is provided with keys 184 extending into keyways in the lower portion of the hub of plate 180. The pressure plate surrounds a spacing sleeve 186 on the shaft 152. The disc 166 has an arcuate port 198 (see the dotted lines in FIG. 24 and FIGS. 25 and 26) a little less than 90° in extent and a second closely adjacent port 200 of limited extent, about 10°. When the turret is at positions A and B, suction will be applied through the long arcuate port 198 to all of the perforations 178 at those positions. At position C a blast of air under control of a cam 201, see FIG. 5, on the cross shaft 34 controlling a piston in an air chamber will be delivered to the perforations 178 via port 200. Air under pressure and suction are delivered to the ports by suitable ducts 203 and 204, respectively.

At position A the leaf is received from the die 106 and at position C the leaf is blown up against a solvent wetted cathode sleeve 205 wetted with a solvent for the binder in the emissive strip so that the leaf may wrap itself about and adhere to the sleeve. The function of the air is to bring about contact of a limited area of the leaf with the sleeve, after which the leaf aided by the solvent wraps itself completely about the sleeve.

The sleeves are fed to a position immediately above position C from a hopper 210, see FIGS. 1, 3 and 15 to 18. The hopper has a rather thick downwardly sloping bottom wall 212 along which the cathode sleeves will slide to the delivery end of the hopper. In this particular illustration, the cathode sleeves 205 are seamless hollow elongated bodies which are oval in cross section. To feed the sleeves to the spout in vertically stacked relationship, the front wall 214 of the hopper is vertical and spaced away from the front bevelled edge of the wall 212 by a distance slightly greater than the minor diameter of the oval. Thus the sleeves will be stacked up one above the other, in horizontal position in the space between the two walls with the major axis of the ovals in a vertical plane. To assist in effecting movement of the sleeves down through the mouth of the hopper, a vibrating tapper 215, FIG. 1, is provided to tap against a side wall of the hopper, the same being operated by an air motor 217 supplied by a line 219 under control of a valve 221 and cam 224 on shaft 24. Beneath the hopper is a reciprocable slide 216 provided with a cross recess 218 of a depth to completely receive a sleeve, major diameter vertical, but wide enough to accommodate the sleeve when the major diameter of the sleeve is horizontal. A gating mechanism is provided to dispense the sleeves from the hopper one by one, this comprising a lug 220 fastened to the slide and a spring leaf 222 secured cantilever fashion to the front wall of the hopper. The lower end of the spring leaf passes through a slot in a gate bar 224 which will release a sleeve 205 when the lug 220 tensions the leaf 222. On the return stroke of the slide, the sleeve 205 below the bar and which is now on top of the slide, will fall into the recess 218 in the slide. The slide is further provided with a longitudinal slot 226 intersecting but not as deep as the cross slot 218. When the sleeve lies broadside down in the slot 218, with the major axis horizontal, the bottom of the slot 226 is above the sleeve. A dog 228 pivoted on a bracket 230 extending from a side wall of the hopper and pressed downwardly by a spring 232 rides in the slot 226 and will tend to rotate the sleeve to flat horizontal position as the slide with the sleeve in the cross slot rides under the dog. To hold the sleeve in an adjusted position, the slide is provided with a suction passageway 234 connected to a suction line 235, see FIG. 2, via a valve 237 operated by a cam 239 on shaft 24. The line 235 communicates with the recess 218 via a port 236. To triply ensure the positioning of the sleeve in the recess with the major axis horizontal, the slide is reciprocated to a projected position when a sleeve is held in the cross slot slightly beyond where the sleeve is engaged and rotated by the dog. Then the slide is slightly retracted to again cause the dog to engage the sleeve were it not previously rotated, and then the slide is projected to a still farther and sleeve discharge position, again subjecting the sleeve to the action of the dog. The three motions of the slide in the advance of the sleeve and their relative extent are indicated at 1st, 2nd and 3rd. The means for reciprocating the slide comprises a roller 238, FIG. 15, mounted in the forked end 240 of the slide and a bell-crank lever 242 pivoted in a bracket 244 and having spring controlled jaws 246 straddling the roller 238, the lever being oscillated by a cam 248 fixed on shaft 40 and contoured to give the stated oscillatory motion of the slide. Adjustable stops 250 and 252 are provided to limit the throw of the slide.

At the delivery position, the cathode sleeve is picked up by a pair of fingers 260 and 261, see FIG. 5, mounted on an upper cathode holder turret 262 which indexes through a number of positions at one of which the cathode sleeve is picked up from the reciprocable bar, at another of which the cathode sleeve is coated with a solvent for the binder in the electron emissive material, at still another of which the emissive coating leaf is applied to the sleeves and at yet another position the coated sleeve is deposited on a carry off conveyor. The fingers 260 and 261, constituting a pair to grasp a cathode sleeve are mounted on a bracket 264 readily fastened to the turret as by centering pin 266, FIG. 15, and bolts 268. There are twelve such pairs of fingers. Each of these pairs of fingers is mounted on a portion of a bracket which overhangs the turret, one finger 260, see FIGS. 19 and 20, being fixed in a recess 269 in the bracket as by a bolt 270 and the other finger 261 being pivoted in a recess in the bracket as by pivot pin 272.

The lower free ends of the fingers are urged together by a spring 273 under compression lying in recesses in the upper ends of the fingers. The lower end of the movable finger is limited in its approach movement toward the fixed finger by reason of a protuberance 274 thereof engaging the bracket 264. The lower ends of the fingers are shaped to hold a cathode sleeve lengthwise therebetween. With some forms of cathodes it is desirable that the sleeve shall be held with the lower edge of the sleeve below the tips of the fingers as is here illustrated. With other forms of cathode sleeves it may be desirable to retain the sleeves in recesses 276 provided in the opposing faces of the fingers near their lower ends. When the cathode sleeve is held by the fingers, the sleeve may be brought close to the upper face of a perforated plate 179 on the emissive material carrier turret. The cathode sleeve is generally held with the minor diameter of the oval vertical and the fingers when lowered by the turret, will bring the cathode sleeve along a line parallel to the two lines of holes in plate 179, see FIG. 28, but preferably offset from the line midway between the two lines so as to cause the leaf of emissive material when it wraps itself about the sleeve to have the joint at the side of the sleeve, as seen in FIG. 29, rather than at the mid top of the sleeve. In the case

of sleeves of rectangular cross section, the joint would be along the narrower face of the rectangular sleeve.

The turret plate **262**, FIG. 5, surmounts a vertical shaft **278** rotatably and vertically slidable in bearings **280** and **282** in the housing **26** and is fastened to the shaft in any conventional fashion as indicated at **283**. The lower limit of motion of the shaft is determined by the engagement of a split stop nut **284** with the top of bearing **280**, the stop nut being adjustably threaded on a sleeve **286** extending down from the turret. To raise and lower the turret, the shaft **278** has fastened thereto by conventional means, such as that indicated at **287**, a grooved collar **288** cooperating with the follower rollers **289**, see FIG. 4, on the fork **290** of a lever **292** connected by a spring link **294**, see FIG. 35, to the end of a lever **296** pivoted at **298** in a block **300** mounted on the housing **36**, said lever **296** carrying a cam follower **302** riding in a cam track in the side face of cam **304** fixed on shaft **24**. The lower end of the shaft **278** has fixed thereto, in conventional fashion, a large gear wheel **306** meshing with the long gear **164** at all times but slidable vertically therealong. Since the indexer gear **160** is being indexed by cooperation of its followers **162** with the cam **168**, the meshing gear wheel **306** will similarly be indexed. The teeth of the gear wheel and gear, however, are in the ratio of 12 to 8. Thereby the two turrets are synchronously indexed through appropriate angular distances. The parts including the cams are so related that the vertical movements of the turret **262** will take place between indexing movements of the two turrets.

The two turrets rotate in opposite directions, as indicated by the arrows in FIG. 2, the turret carried fingers being supplied with cathode sleeves at the loading position indicated at L in FIG. 2. At this position and in timed relation with the movements of the slide **216**, the pivoted finger is opened up on lowering the upper turret by the action of lever **292** and is closed prior to this turret being lifted. To effect the opening of the movable finger **261** at the loading station L, it is provided with a roller **308** above the pivot **272**, which when the turret is indexed and lowered comes opposite the end of a lever **310**, see FIG. 3, operated by a peripherally grooved cam **312** fixed on the shaft **40**. The cam serves to hold the finger open when the slide **216** positions a sleeve between the fingers whereupon the fingers are permitted to close under the influence of spring **273** and the fingers rise with a sleeve properly held between them. The fingers are next indexed to an idle station M whereat the turret is lowered and raised while another pair of fingers is supplied with a sleeve at station L. At the next indexed position N of the fingers, when the sleeve held by the fingers is lowered, it will be wetted by a solvent for the binder in the emissive coating as will be described. The nature of the film embodying the emissive coating and the solvent for the coating is set forth at length in the application of Kerstetter and Wennin filed August 31, 1954, and bearing Serial No. 453,235 to which reference may be had for further particulars as to these matters. It is sufficient to point out here that the emissive materials comprising the triple carbonates of barium strontium and calcium or other like materials are held in a self supporting state by a binder of nitrocellulose material which is soluble in commercial acetates and in other solvents. If a cathode sleeve be wetted by a solvent for the binder and the so wetted sleeve and strip of emissive material be brought into contact even over a small area, the strip will wrap itself completely about the sleeve due to a surface tension phenomenon.

The wetting of the sleeve is effected by the following mechanism: Supported by the top face of the housing **36** and beneath the fingers at station N is a reservoir **314**, see FIGS. 21 to 23, having within it the volatile solvent and provided with a constantly operating motor-pump combination **316** for pumping the solvent up through a pipe **318** to a nozzle **320**. Fitted within the nozzle is a porous wick in the form of a felt **322** which is pinned to the nozzle by a pin **324** to prevent the pressure of the fluid from driving the felt out of the nozzle. The top of the felt has a longitudinal recess **326** of a depth substantially equal to the minor diameter of the sleeve. The pump has a sufficient force and capacity so that a constant stream of solvent gushes over the felt and over the sleeve, when the sleeve is lowered, to thoroughly wet the outer surface of the sleeve. The overflow is caught in a cylinder **328** surrounding the nozzle and a solvent return pipe **330** returns the excess solvent to the reservoir. A by pass **332** with an adjustable pressure valve **334** therein controls the rate of flow of solvent through the nozzle. A vent **336** prevents creation of undesired pressures in the reservoir. Liquid may be added to the reservoir in any desired manner as by inserting a loose fitting pipe through the vent and into the reservoir and a drain cock **337** is provided to empty the reservoir and other parts. The recess in the felt is in line with the longitudinal axis of the sleeve when the sleeve is lowered into the recess in the felt which the sleeve may compress very slightly. Desirably the felt is not compressed by pressure of the sleeve but the sleeve may contact the felt. On the approach of the sleeve to the felt and on its movement away therefrom the gushing solvent is sure to coat the sleeve.

At the next index station O of the finger equipped turret, the cathode sleeve held by the fingers is brought into vertical alignment with the cathode leaf resting on the plate **179** at the station C of the lower turret. See FIGS. 27 to 30. On lowering of the fingers the cathode sleeve is brought, broadside on, close to but not in contact with the leaf. As the lower turrent **150** indexes from station B to C, the suction to the perforations in land **178** and plate **179** is maintained on until the very last part of the indexing movement of the turret. At the conclusion of the indexing operation the perforations are in communication with the port **200**, but no gas is flowing through the port and perforations. When the wetted cathode sleeve **205** is brought down close to the plate **179**, gas in the form of air is admitted via valve **202** to the perforations **178**, **179A** and **179B** whereby the leaf will be wafted into contact with the underface of the sleeve. The solvent on the sleeve thereupon progressively dissolves portions of the binder in the leaf in directions away from the first line of contact of leaf and sleeve, causing the leaf to wrap itself about the sleeve. The holes **179A** and **179B** are so spaced from the central axis of the sleeve, that the material of the leaf will wrap itself around the sleeve with the joint of the material abutting at the narrow edge or at the end of the major diameter of the sleeve. The sizes of the sleeve and leaf are such that the leaf will coat the sleeve for a desired length leaving the ends of the sleeve and adjacent area bare, as will be seen in FIG. 30, with just one wrap of material and without overlapping of the leaf edges on the sleeve.

In indexing of the upper cathode sleeve carrying turret from station N to station O, see FIG. 2, the solvent on the sleeve is apt to pile up on the leading end due to inertia of the liquid when the indexing motion stops. This would cause an undesirable solvent action on the leaf material since more liquid would act on the binder at one portion of the sleeve than at another. To counteract this piling up action, an air nozzle **338** is positioned on the top of the housing **36** and it blows a puff of air, from an air pump **339** operated by a cam **341** on the main drive shaft **24**, toward the trailing end of the sleeve as the sleeve reaches its indexed position thereby evenly distributing the solvent along the length of the sleeve.

Circumferentially about the periphery of the lower ends of the fingers, when they are in lowered position, and extending through the next five stations P, Q, R, S and T is a tuyere **340** directing hot air from a suitable source against the coated cathode sleeves to partially evaporate

the solvent remaining on the sleeves. The sleeves are finally dried on a take off conveyor, as will be described. the tenth station U, may be an idling station. At the eleventh station, V, the coated sleeves are conveyed away from the upper turret and the twelfth station, W, is again an idling station. At station V an endless conveyor belt **342**, see FIGS. 31 to 34, removes the coated and partially dried sleeves from the vicinity of the turrets. The belt comprises linked together crosswise buckets **344** each mounted on a pair of right angular pieces **346** and shaped to form links **348** of a chain much like a bicycle chain, the chain passing over an idler sprocket **350** and a driving sprocket **352**, these being supported in the ends of an extensible frame **354** for tightening the chain. The buckets have arcuate bottoms **356** so as to prevent contact of the coating on the sleeve with the buckets. The driving sprocket is fixed to an axle **360** in vertical alignment below the coated cathode sleeve held by the fingers on the upper turret. The buckets are brought to position beneath the fingers in synchronism with the indexing of the turrets and a sleeve will be permitted to drop into a bucket after the turret and the fingers have been lowered by operation of a lever **362** pressing against a roller **308** on the pivoted finger **361**. The lever **362** is pivoted at **364** in a bracket **365** fixed to the top of housing **36** and operated by a link **366** connected to an arm **367** pivoted on the housing and having a cam follower roller **368**, see FIG. 3, operated by a cam **369** fixed on the shaft **40**. The bracket also through universally adjustable parts supports one end of the conveyor. The lever **362** will engage and shift the roller **308** on the pivoted finger to release the coated cathode sleeve after turret indexing has stopped and the turret has been lowered to ensure accurate positioning of the sleeve in the bucket upon finger release of the sleeve.

Indexing of the conveyor is accomplished by fixing on the axle **360** a ratchet wheel **370** driven by a pawl **372** mounted in the fork of a ratchet arm **374** and urged by a spring **375** into engagement with the ratchet wheel **370**. The ratchet arm is connected by a link **376** with one end of a lever **378** pivoted on a bracket **380** fastened to the housing. The other end of the lever has a roller **382** bearing against a cam **384** fast on the shaft **40**. Springs **386** and **388** serve to maintain the cam follower rollers **368** and **382** against their respective cams.

To accomplish further drying of the coated sleeves, the conveyor is enclosed by a heat shield **390** and infra red lamps **392** are positioned in the shield above the conveyor and along the length thereof to direct their rays against the conveyor and the articles carried thereon.

The conveyor **342** will deliver the sleeves to any suitable form of compartmented tray (not shown) to individually receive the coated cathode sleeves. For the purposes of this disclosure, merely a conventional receptacle **394** is disclosed beneath the delivery end of the conveyor.

What is claimed is:

1. A machine for coating a cathode base with a leaf of electron emissive material and wherein said material is held within a soluble binder comprising means to feed said leaf and base toward each other, means to coat the base with a solvent for the binder in the leaf upon movement of the base toward the leaf, and an air draft means blowing against the leaf to effect initial contact of the leaf with a small area of the base whereupon the leaf wraps itself completely about the base.

2. A machine for coating an article with a leaf having a soluble binder comprising strip coating material feeding mechanism, a first conveyor, means to stamp out a leaf from said coating material and transfer the same to the first conveyor, an article dispensing mechanism, a second conveyor, means on said second conveyor to receive articles dispensed by said dispensing mechanism with the said conveyors displaced and synchronously indexed to bring an article into registration with a leaf at an indexed position of the conveyors, means to coat said article with a solvent for the binder in the leaf, subsequent means to bring about contact of said leaf and article while in said registration whereby the leaf will wrap itself about the article, and means to release the article with the leaf wrapped thereabout from the second conveyor.

3. A machine for coating cathode bases with leaves of electron emissive material, one leaf for each cathode base, and wherein the material is held in a soluble binder comprising a first turret mounted on a shaft, means for supplying said first turret with said leaves, a second turret, mounted on a shaft parallel to that of the first turret and movable in a direction longitudinally of its shaft, means for supplying said second turret with cathode bases, means for synchronously indexing the two turrets and for shifting the second turret along its shaft axis for each indexing operation, means for applying solvent for the binder in the leaf to each cathode base upon an axial shifting movement of the second turret, means for effecting seriatim contact of the leaves with the cathode bases synchronized with a subsequent axial shifting movement of the second turret whereby the leaves wrap themselves about the bases and form wrapped cathodes, and means for releasing the wrapped cathode bases from the second turret.

4. A machine for coating a cathode base with a leaf of electron emissive material and wherein the material is held in a soluble binder comprising a first lower turret indexible on a vertical axis, spaced areas on the upper face of said turret each adapted to receive a leaf, a second upper turret on a second vertical axis offset from said first axis and synchronized for movement with said first turret and vertically reciprocable on said second axis, spaced cathode base holding fingers mounted on the periphery of said second turret and positioned over the first turret areas in one of the indexed positions of the turrets, means for vertically reciprocating said upper turret for each indexing movement thereof, means for feeding said fingers with cathode bases on one vertical reciprocation thereof, means for applying a solvent for the binder in the emissive material to a cathode base held by the fingers on another reciprocation of the turret, means for bringing the leaf and base close to each other on a subsequent reciprocation of the upper turret and when in the stated overlying relation of fingers and area, means for transferring the leaf into contact with a small area of the cathode base whereby the leaf will wrap itself about the cathode base to form a wrapped cathode base, and means for releasing the wrapped cathode base from the fingers.

5. A machine for coating a cathode base with a leaf of electron emissive material wherein the material is held within a soluble binder comprising a first lower turret indexible on a vertical axis, spaced perforated areas on the upper face of the turret and adjacent the periphery thereof, each adapted to receive a leaf, a mechanism adjacent the periphery of the turret having means for feeding leaves to the turret, a second upper turret on a second vertical axis displaced from said first axis and synchronized for indexing movement with said first turret and vertically reciprocable on said second axis, spaced cathode base holding fingers mounted on the periphery of said second turret and positioned over the first turret areas in one of the indexed positions of the turrets, means for vertically reciprocating the upper turret for each indexing movement thereof, means for feeding said fingers with a cathode base on one vertical reciprocation thereof, means for applying a solvent for the binder in the leaf to a cathode base held by the fingers on another reciprocation of the turret, means for bringing the cathode base close to the leaf on reciprocation of the upper turret and when in the stated overlying relation of fingers and area, and means for blowing a gas through perforations in a leaf turret area and against the under face of the leaf lying on the perforated area when the cathode base is close to the leaf, whereby the leaf will contact

a small area of the cathode base and will then wrap itself about the base to form a wrapped cathode base, and means for releasing the wrapped cathode base from the fingers.

6. A machine for coating a cathode base with a leaf of electron emissive material and wherein the material is held within a soluble binder comprising a first, lower turret indexible on a vertical axis, spaced perforated areas on the upper face of the turret and adjacent the periphery thereof, each adapted to receive a leaf, a mechanism at a first station, adjacent the periphery of the turret, having means for feeding leaves onto said lower turret and over said perforated areas, a second, upper turret on a second vertical axis displaced from said first axis and synchronized for indexing movement with said first turret, and vertically reciprocable on said second axis, spaced cathode base holding fingers mounted on the periphery of said second turret and positioned over the perforated areas in the first turret in one of the indexed positions of the turrets, means for vertically reciprocating the upper turret for each indexing movement thereof, means for feeding said fingers with a cathode base on one vertical reciprocation thereof, means for applying a solvent for the binder in the leaf to a cathode base held by the fingers on another reciprocation of the turret, means, at a subsequent station, for bringing the cathode base close to the leaf on reciprocation of the upper turret and when in the stated overlying relation of fingers and perforated area, means for applying suction to the perforated areas during the movement of the first turret from the leaf feeding station to where it is close to the subsequent station, means for blowing air through said perforations at the subsequent station, only, after the cathode base has been brought close to the leaf in overlying relationship, whereby the leaf will be transferred from the perforated area into contact with an undersurface of the cathode base and will wrap itself about the base to form a wrapped cathode base, and means for releasing the wrapped cathode base from the fingers.

7. A machine for coating a cathode base with a leaf of electron emissive material and wherein the material is held within a soluble binder, the base being non circular and presenting a cross-section having a major and a minor diameter, said machine comprising a first, lower turret indexible on a vertical axis, spaced areas on the upper surface of the turret and adjacent the periphery thereof, each adapted to receive a leaf, a mechanism adjacent the the periphery of the turret, having leaf feeding means, a hopper for the cathode bases, means for dispensing individual successive bases from said hopper, a slide beneath the hopper to receive the bases, means above the slide to engage the bases on the slide and rotate them to bring the major diameter of the bases into a horizontal position, a second, upper turret on a second, vertical axis displaced from said first axis and synchronized for indexing movement with said first turret and vertically reciprocable on said second axis, spaced cathode base holding fingers mounted on the periphery of said second turret and positioned over one of said spaced areas of the first turret in one of the indexed positions of the turrets, means for vertically reciprocating the upper turret for each indexing movement thereof, said fingers picking up an orientated base on the slide on one vertical reciprocation of the second turret, means at a subsequent reciprocation of the second turret to bring the cathode base held by the fingers over and close to a leaf on the first turret, means for wrapping the leaf about the base to form a wrapped cathode base, and means for releasing the wrapped cathode base from the fingers.

8. A machine for coating a cathode base with a leaf of electron emissive material and wherein the material is held within a soluble binder, the base being non circular and presenting a cross-section having a major and a minor diameter, said machine comprising a first, lower turret indexible on a vertical axis, spaced areas on the upper surface of the turret and adjacent the periphery thereof, each adapted to receive a leaf, a mechanism adjacent the the periphery of the turret, having leaf feeding means, a hopper for the cathode bases, means for dispensing individual successive bases from said hopper, a slide beneath the hopper to receive the bases, a finger above the slide to engage the bases on the slide and rotate them to bring the major diameter of the bases into a horizontal position, means to reciprocate the slide several times with variable strokes past the finger for each indexing movement of the lower turret, a second upper turret on a second, vertical axis displaced from said first axis and synchronized for indexing movement with said first turret and vertically reciprocable on said second axis, spaced cathode base holding fingers mounted on the periphery of said second turret and positioned over one of said spaced areas of the first turret in one of the indexed positions of the turrets, means for vertically reciprocating the upper turret for each indexing movement thereof, said holding fingers picking up an orientated base on the slide on one vertical reciprocation of the second turret, means at a subsequent reciprocation of the second turret to bring the cathode base held by the holding fingers over and close to a leaf on the first turret, means for wrapping the leaf about the base to form a wrapped cathode base, and means for releasing the wrapped cathode base from the holding fingers.

9. A machine for coating a cathode base with a leaf of electron emissive material and wherein the material is held within a soluble binder, the base being non circular and presenting a cross-section having a major and a minor diameter, said machine comprising a first, lower turret indexible on a vertical axis, spaced areas on the upper surface of the turret and adjacent the periphery thereof, each adapted to receive a leaf, a mechanism adjacent the the periphery of the turret, having leaf feeding means, a hopper for the cathode bases, means for dispensing individual successive bases from said hopper, a slide beneath the hopper to receive the bases, a finger above the slide to engage the bases on the slide and rotate them to bring the major diameter of the bases into a horizontal position, suction means to hold the bases against the slide, a second upper turret on a second vertical axis displaced from said first axis and synchronized for indexing movement with said first turret, and vertically reciprocable on said second axis, spaced cathode base holding fingers mounted on the periphery of said second turret and positioned over one of the spaced areas of the first turret in one of the indexed positions of the turrets, means for vertically reciprocating the upper turret for each indexing movement thereof, said holding fingers picking up an orientated base on the slide on one vertical reciprocation of the second turret, means at a subsequent reciprocation of the second turret to bring the cathode base held by the holding fingers over and close to a leaf on the first turret, means for wrapping the leaf about the base to form a wrapped cathode base, and means for releasing the wrapped cathode base from the holding fingers.

10. A machine for coating an article with leaf material comprising means to bring the article and leaf in close proximity with a slight spacing therebetween, the leaf having associated therewith a soluble binder, means for applying a solvent for the binder to the article, means to transport the leaf toward the article so that only a small area of the leaf makes initial contact with the article, the action of the solvent then effecting the adherence of the entire leaf to the article.

11. A machine for coating an article having an arcuate surface with planar leaf material comprising means to bring the article and leaf in juxtaposition to each other, but out of contact, said means having a planar surface to support the leaf in planar condition, said article having associated therewith a soluble binder, means for applying a solvent for the binder to the article, means to transport the planar leaf toward the article so that a restricted

area only thereof contacts the arcuate surface of the article, the action of the solvent on the binder then effecting the adherence of the entire leaf to the article.

12. A machine for coating cathode bases with leaves of electron emissive material, one leaf for each cathode base, and wherein the material is held in a soluble binder, comprising a support for said leaves, an indexible carrier adjacent said support for transporting a cathode base to a position adjacent a leaf on said support, a mechanism for applying a solvent for said binder to the cathode base prior to the base being indexed adjacent to the leaf, a nozzle for blowing the solvent on the base in a direction away from the indexing movement of the indexible carrier and as the carrier reaches a rest position, and means for transferring a leaf from the support into contact with the base whereby the leaf wraps itself about the base.

13. A machine for coating an oval sleeve with a leaf rectangular in outline and of a size to just be able to encompass the sleeve, said leaf having a soluble binder, a perforated support holding the leaf, a second support holding the sleeve with the major axis of the oval parallel to the leaf and with the sleeve juxtaposed to the leaf but with the longitudinal central axis of the sleeve offset from the parallel central axis of the leaf, mechanism for wetting the sleeve with a solvent for the binder and a transporting medium for carrying the leaf into initial small area contact with the sleeve whereby the action of the solvent on the sleeve will cause the leaf to wrap itself about the oval sleeve with the mating edges of the leaf at the sharply rounded edges of the oval sleeve.

14. A machine for coating cathode bases with leaves of electron emissive material, one leaf for each cathode base, and wherein the material is held in a soluble binder comprising a first turret mounted on a shaft, means for supplying said first turret with said leaves, a second turret, mounted on a shaft parallel to that of the first turret and movable in a direction longitudinally of its shaft, means for supplying said second turret with cathode bases, means for synchronously indexing the two turrets and for shifting the second turret along its shaft axis for each indexing operation, means for applying solvent for the binder to each cathode base upon an axial shifting movement of the second turret, said solvent applying means comprising a wick having a recessed end to receive the cathode base upon lowering of the second turret and a pump to force solvent through the wick and over the base when in the recessed end of the wick, means for effecting contact of the leaf with the cathode base synchronized with a subsequent axial shifting movement of the second turret whereby the leaf wraps itself about the base to form a wrapped cathode, and means for releasing the wrapped cathode base from the second turret.

15. A machine for coating a cathode base with a leaf of electron emissive material wherein the material is held within a soluble binder comprising a first lower turret indexible on a vertical axis, spaced perforated areas on the upper face of the turret and adjacent the periphery thereof, each adapted to receive a leaf, a source of suction connected to said perforated areas, a mechanism adjacent the periphery of the turret having means for feeding leaves to the turret, a second upper turret on a second vertical axis displaced from said first axis and synchronized for indexing movement with said first turret and vertically reciprocable on said second axis, spaced cathode base holding fingers mounted on the periphery of said second turret and positioned over the first turret areas in one of the indexed positions of the turrets, means for cutting off said source of suction just prior to the fingers being positioned over the first turret areas, means for vertically reciprocating the upper turret for each indexing movement thereof, means for feeding said fingers with a cathode base on one vertical reciprocation thereof, means for applying a solvent for the binder in the leaf to a cathode base held by the fingers on another reciprocation of the turret, means for bringing the cathode base close to the leaf on reciprocation of the upper turret and when in the stated overlying relation of fingers and area, and means for blowing a gas through the perforated areas and against the under face of the leaf lying on the perforated area when the cathode base is close to the leaf, whereby the leaf will contact a small area of the cathode base and will then wrap itself about the base to form a wrapped cathode base, and means for releasing the wrapped cathode base from the fingers.

16. A machine for coating a cathode base with a strip of electron emissive material having a soluble binder and leaving the ends and adjacent areas on the base bare, indexible carriers to bring the base and strip material in juxtaposition to each other, a pump applying solvent for the binder in the emissive material to a cathode base prior to application of the emissive material to the base, a transport medium for effecting contact of the emissive material with the base whereupon the material covers the base to form a coated base, a nozzle adjacent the base supporting carrier for supplying drying air to the coated base as it is transported by the cathode base carrier, a take-off conveyor beneath the cathode base carrier having seats to engage only the ends of the coated base, and trip mechanism to effect release of the coated base from its carrier to permit the base to fall onto a pair of seats on the take off conveyor.

17. A machine for coating a cathode base with a strip of electron emissive material having a soluble binder and leaving the ends and adjacent areas on the base bare, indexible carriers to bring the base and strip material in juxtaposition to each other, a pump applying solvent for the binder in the emissive material to a cathode base prior to application of the emissive material to the base, a transport medium for effecting contact of the emissive material with the base whereupon the material covers the base to form a coated base, a nozzle adjacent the base supporting carrier for suplying drying air to the coated base as it is transported by the cathode base carrier, a take-off conveyor beneath the cathode base carrier having seats to engage only the ends of the coated base, trip mechanism to effect release of the coated base from its carrier to permit the base to fall onto a pair of seats on the take-off conveyor, and means adjacent the take-off conveyor to further dry the coated base as it is transported by the take-off conveyor.

18. In a coating machine, a slide, supports for a supply of strip emissive material mounted on the slide and movable therewith, a clamp mechanism movable toward and from the slide to clamp and release strip material fed from the supply and resting on the slide, said clamp mechanism being movable with the slide in one direction of movement thereof to feed the emissive material, a punch and die operating through an aperture in the slide to punch out leaves from said material, the punch having a pad cooperative with the die to clamp the strip material during the punching operation and to hold the material while the clamp mechanism and slide conjointly move back to a new feeding position relative to the strip material, a leaf conveyor below the die to receive a punched out leaf, means for feeding a cathode base into registration with a leaf on the conveyor and means to apply the base to said leaf.

19. In a coating machine a housing, a circular turret supported by the housing and having leaf carrying elements equally circumferentially spaced close to the periphery thereof, a second turret supported by the housing and mounted on a parallel axis having cathode base carrying elements equally spaced about its periphery to bring a base to a position over a leaf, means to transfer a leaf to the base and to cause adherence of the leaf about the base, and means to laterally adjust the leaf carrying turret with respect to the base carrying turret comprising an externally cylindrical sleeve rotatably

mounted in the housing with the axis of the leaf carrying turret eccentrically located within the sleeve.

20. A machine for coating an elongated article on its exterior surface with a leaf having a soluble binder therein comprising a support in a fixed horizontal plane having a recess substantially of the size of the leaf to support the leaf, a pair of fingers horizontally spaced apart substantially the length of the article and above the support to support the article with its elongation in a horizontal plane, means for applying to the exterior surface of the article along its length a solvent for the binder in the leaf, means to operate the fingers to bring them in straddling relation to the recess in the support and means to transfer the leaf from out of the recess into contact with an elongated element portion of the article whereupon the wetting of the leaf by the solvent on the article causes the leaf to wrap itself about the exterior surface of the article.

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