

Nov. 8, 1938.

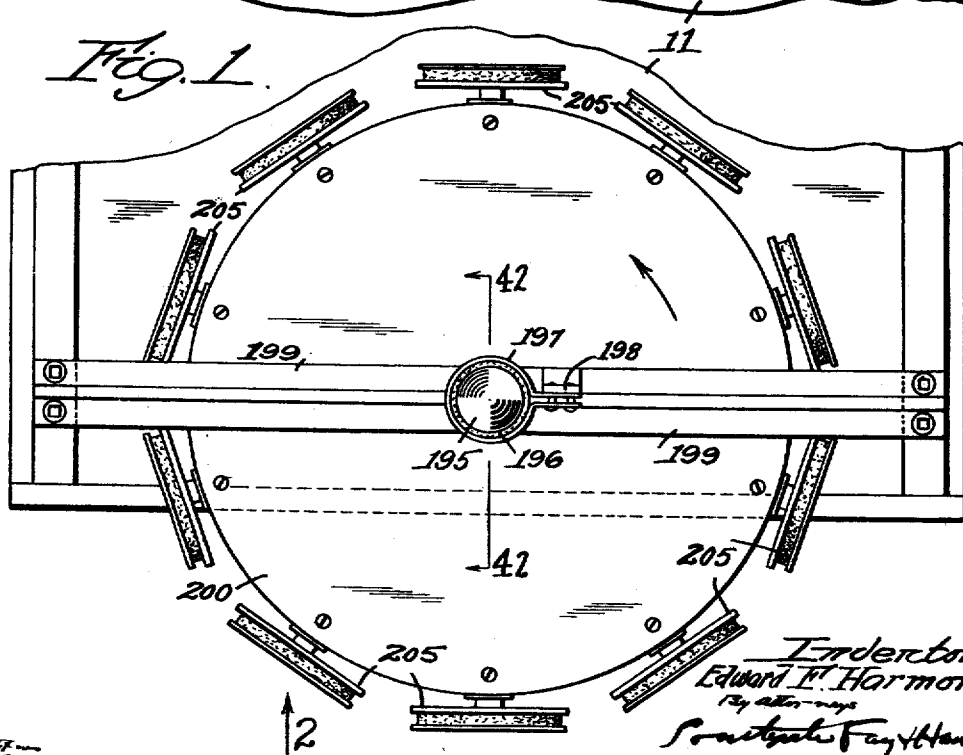
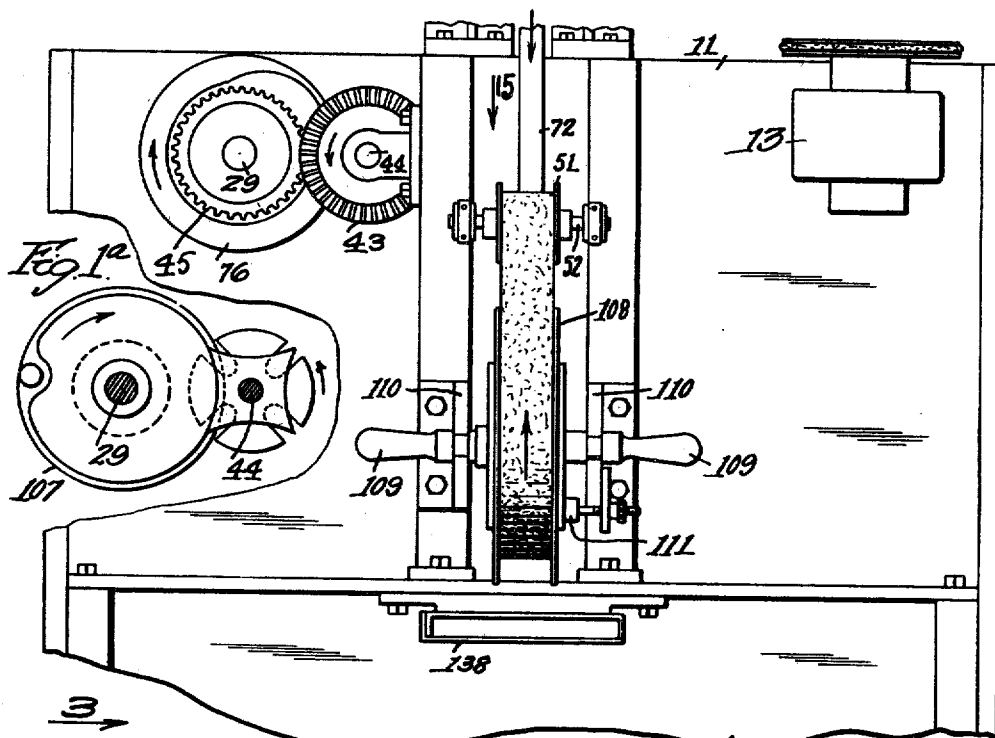
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2,135,751

MACHINE FOR PACKAGING TOOTH BRUSHES

Filed Dec. 13, 1935

12 Sheets-Sheet 1



Nov. 8, 1938.

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2,135,751

MACHINE FOR PACKAGING TOOTH BRUSHES

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12 Sheets-Sheet 2

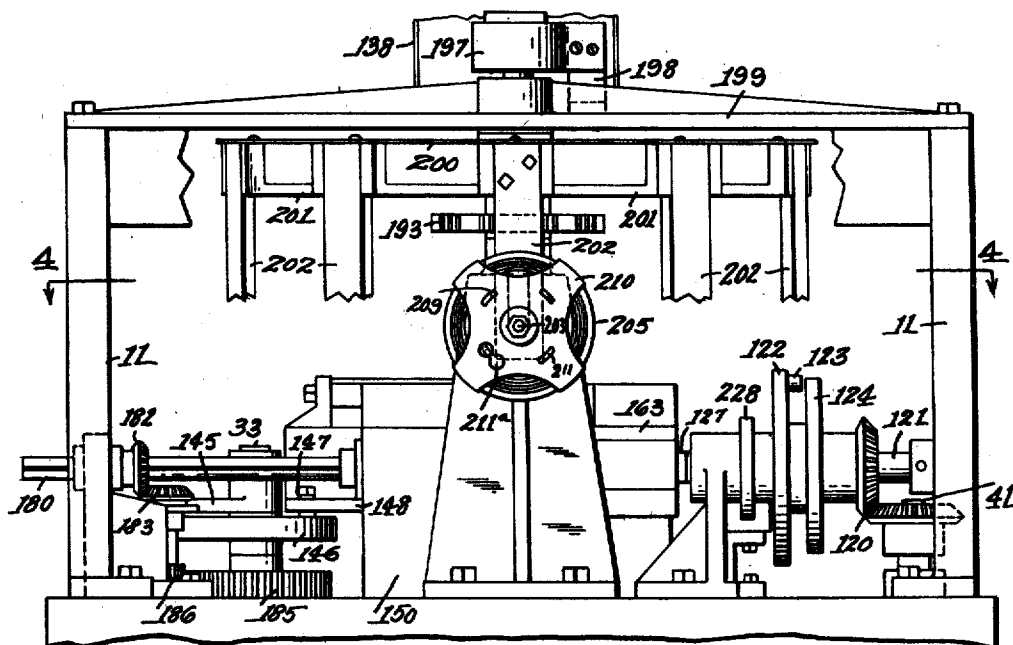


Fig. 2.

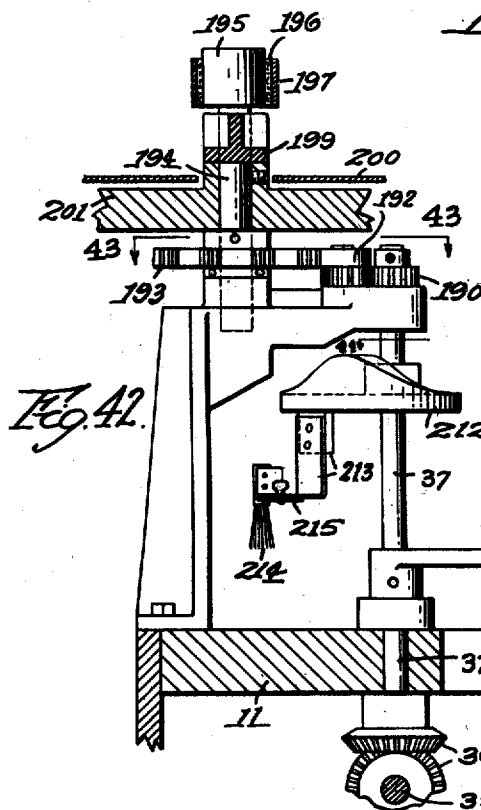
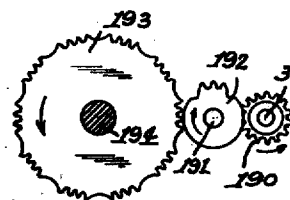


Fig. 42.



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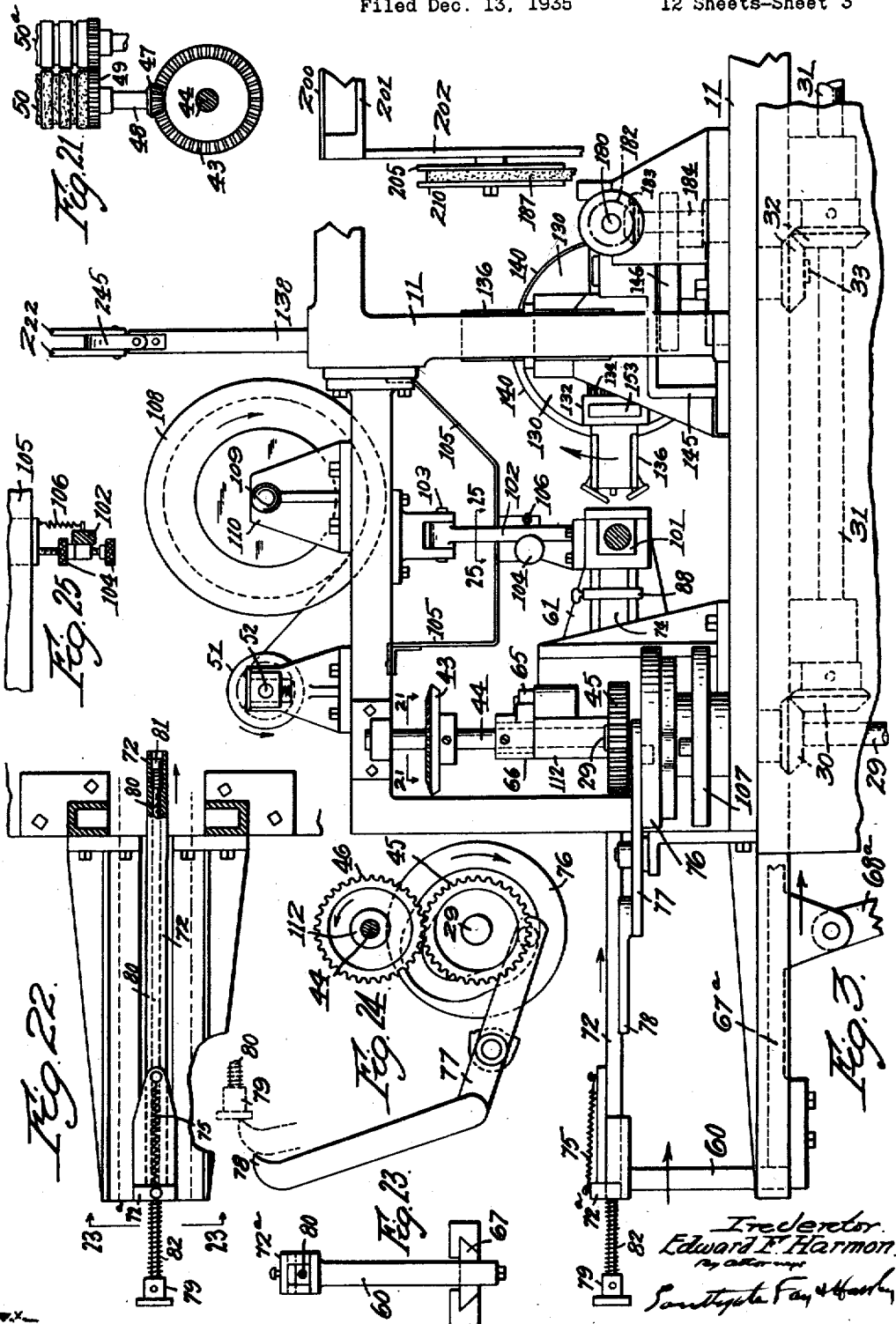
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MACHINE FOR PACKAGING TOOTH BRUSHES

Filed Dec. 13, 1935

12 Sheets-Sheet 3



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MACHINE FOR PACKAGING TOOTH BRUSHES

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12 Sheets-Sheet 4

Fig. 4.

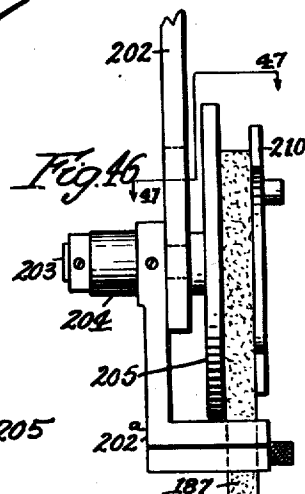
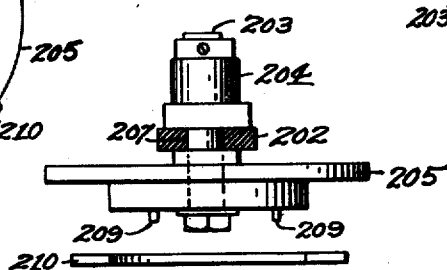
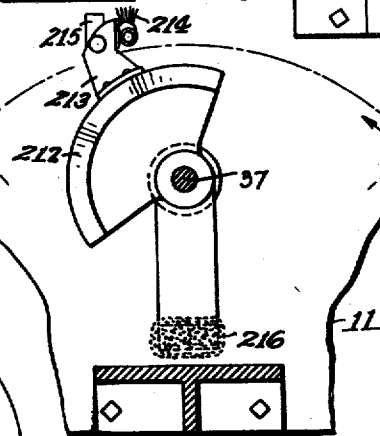
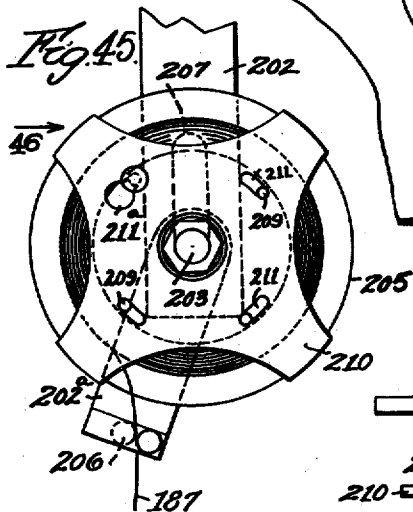
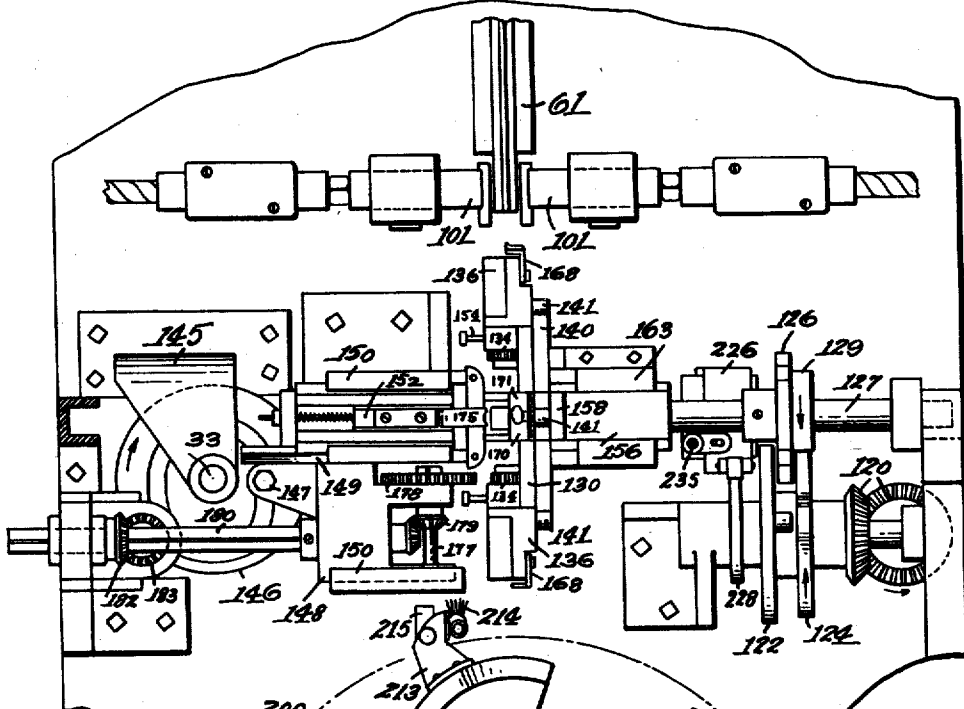


Fig. 47.

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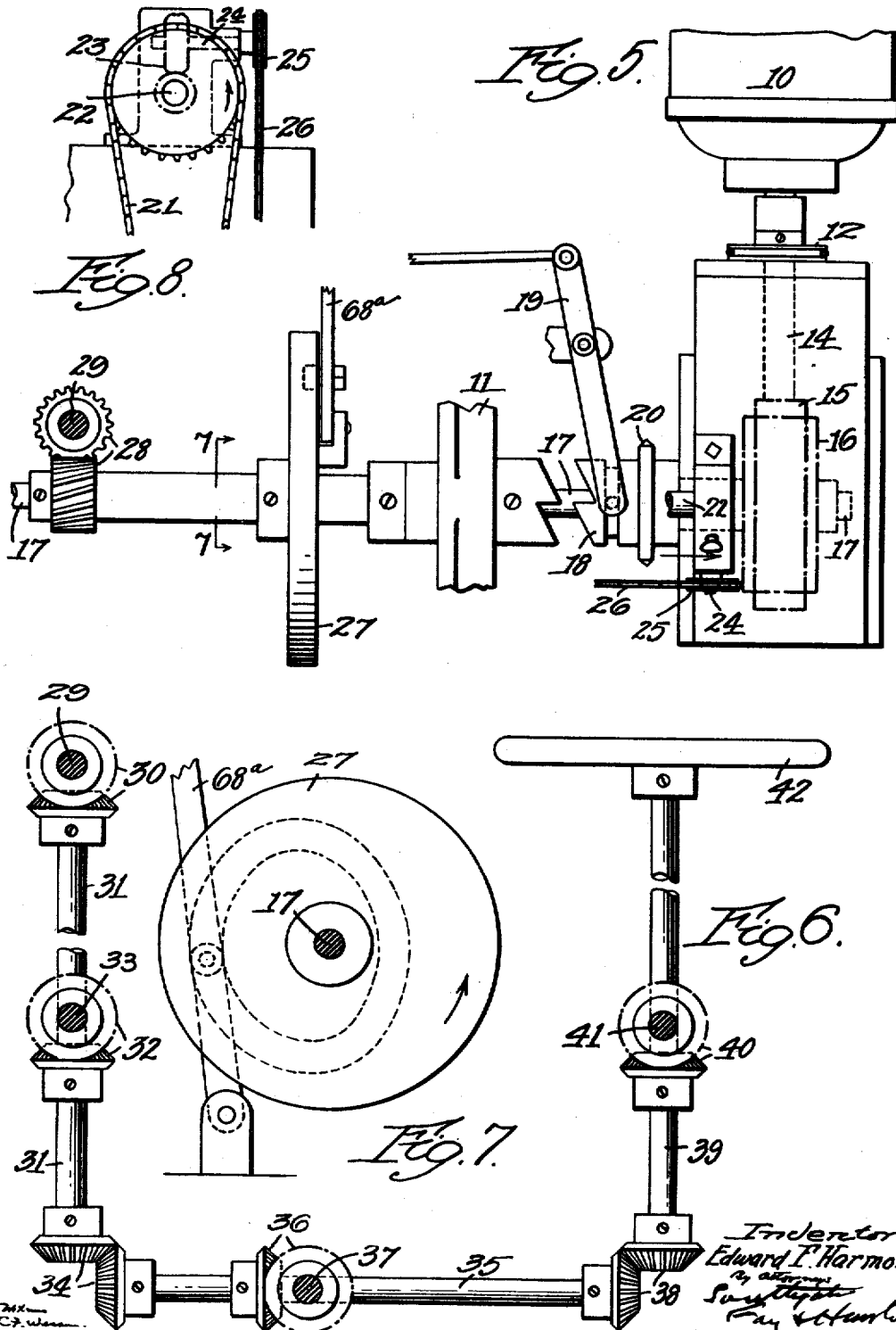
E. F. HARMON

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MACHINE FOR PACKAGING TOOTH BRUSHES

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12 Sheets-Sheet 5



Nov. 8, 1938.

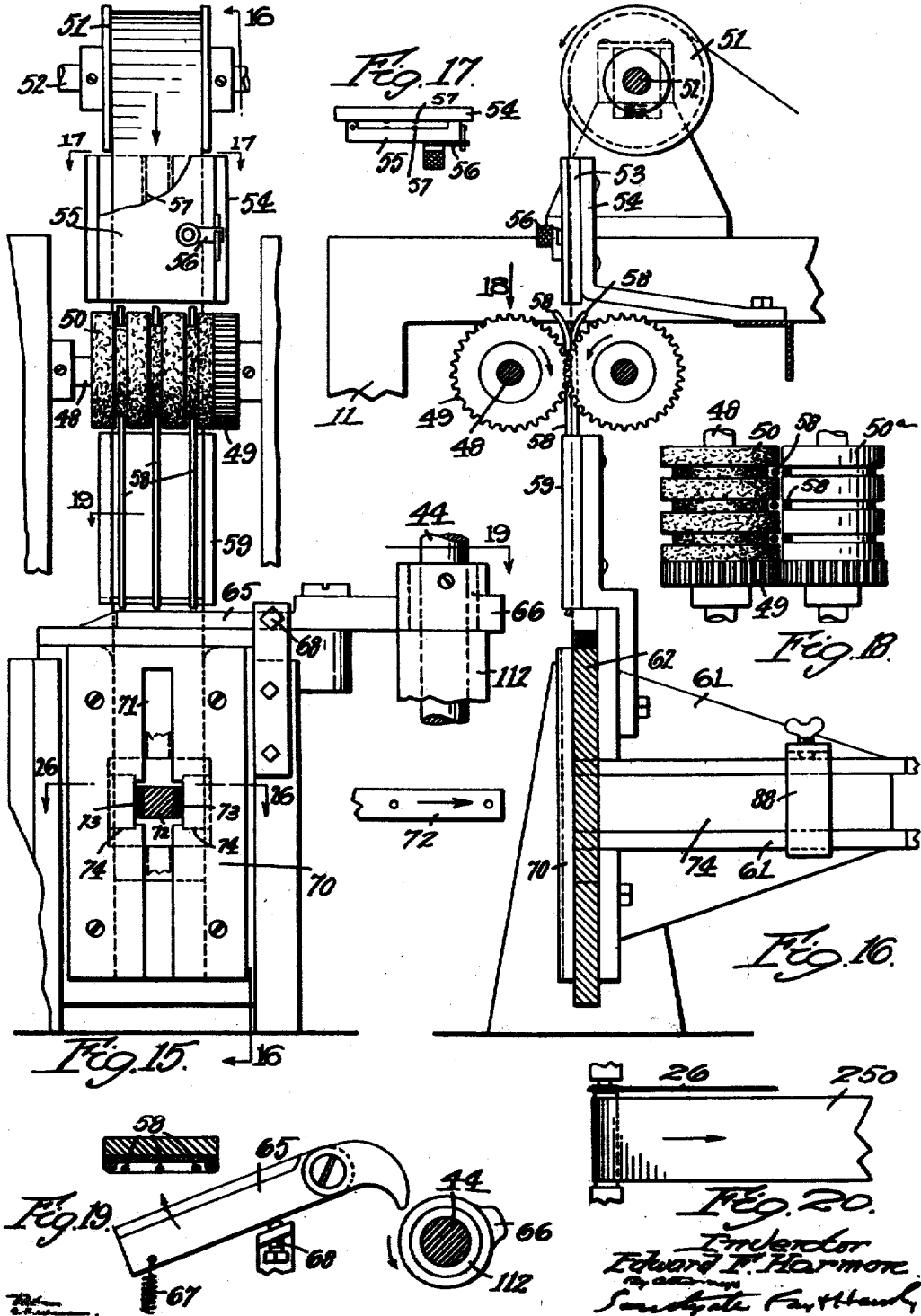
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MACHINE FOR PACKAGING TOOTH BRUSHES

Filed Dec. 13, 1935

12 Sheets-Sheet 7



Nov. 8, 1938.

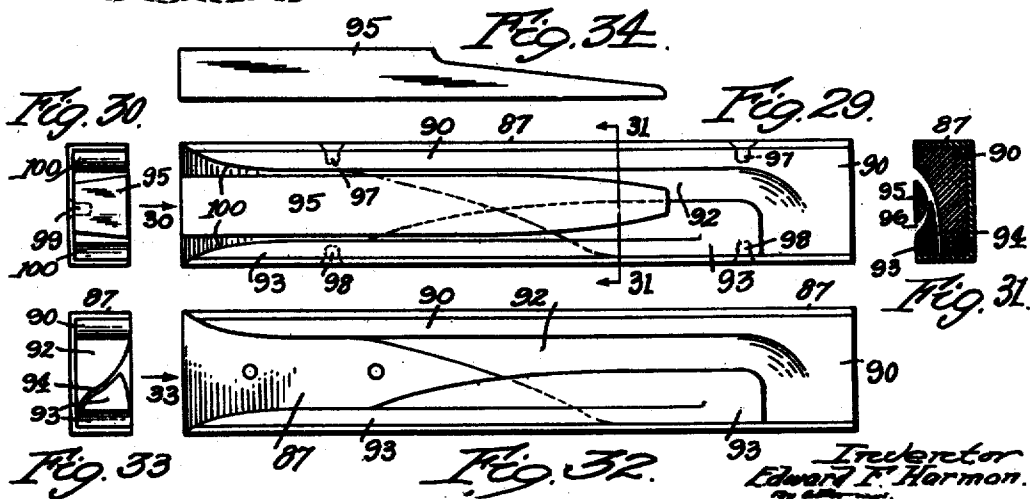
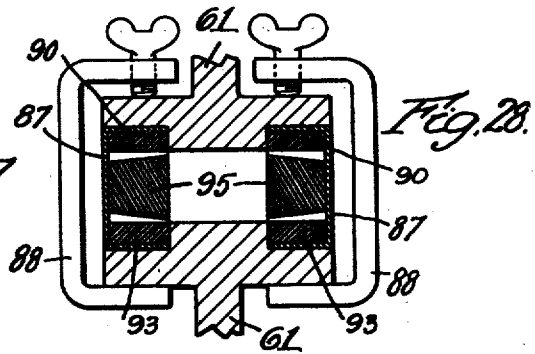
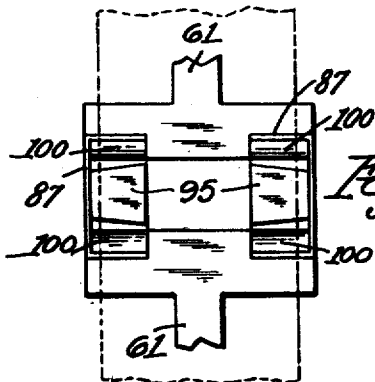
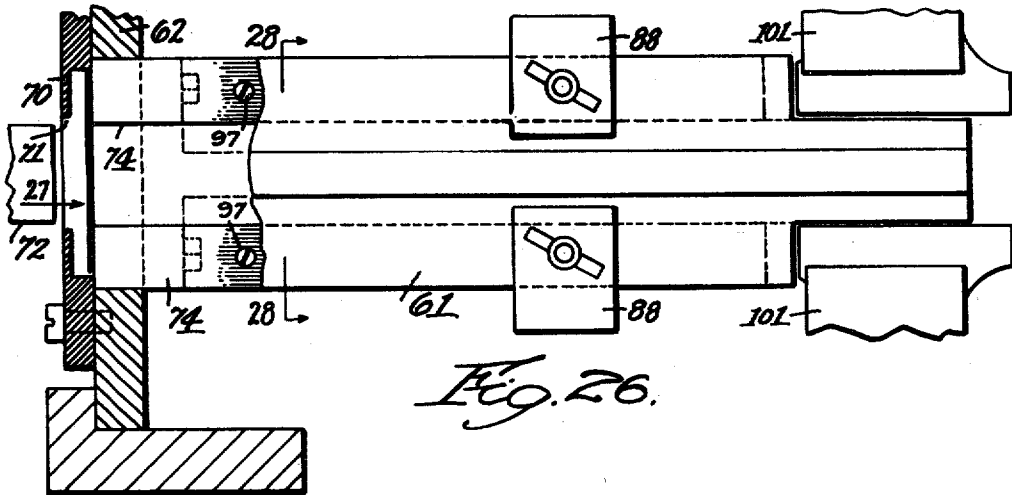
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MACHINE FOR PACKAGING TOOTH BRUSHES

Filed Dec. 13, 1935

12 Sheets-Sheet 8



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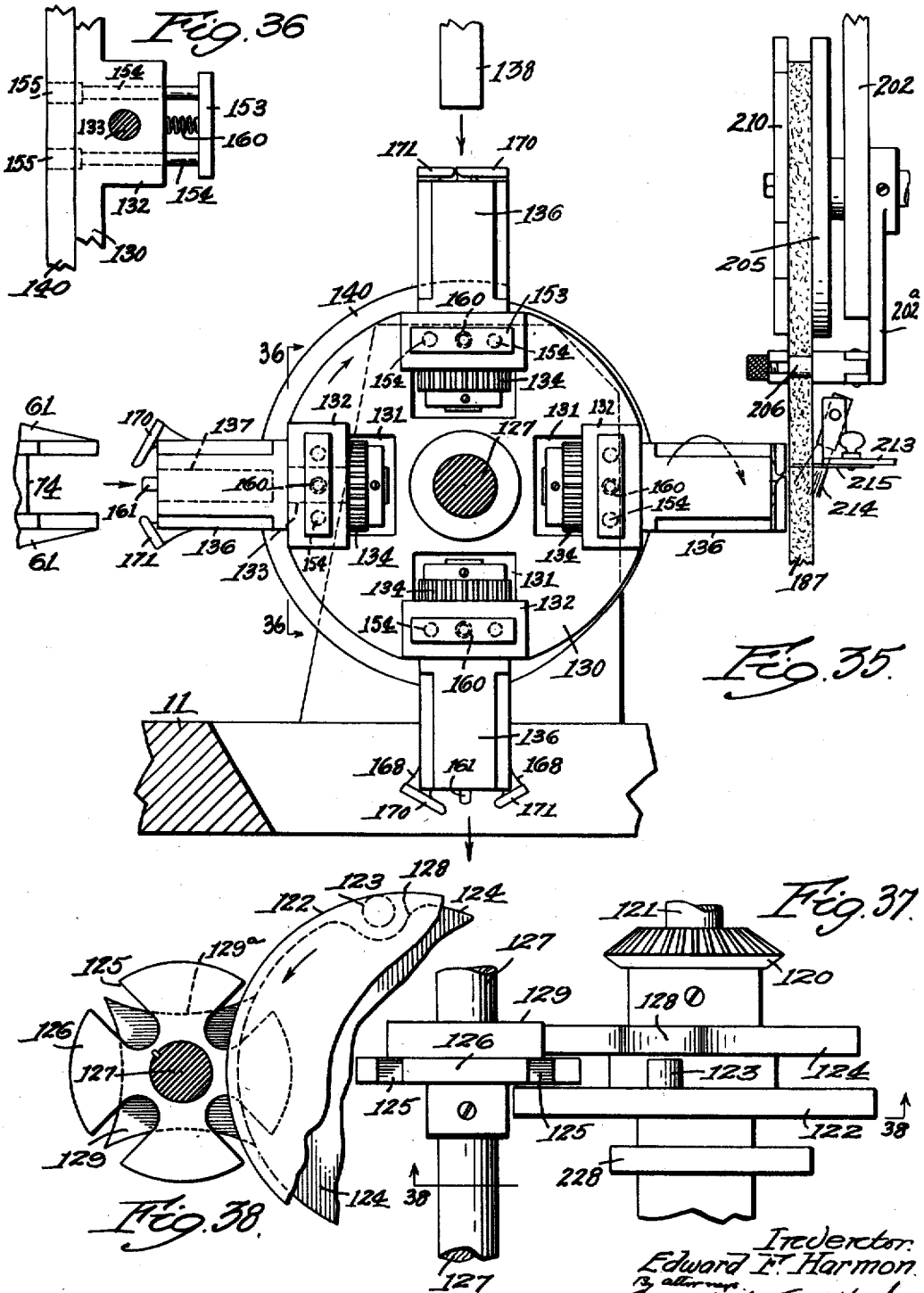
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MACHINE FOR PACKAGING TOOTH BRUSHES

Filed Dec. 13, 1935

12 Sheets-Sheet 9



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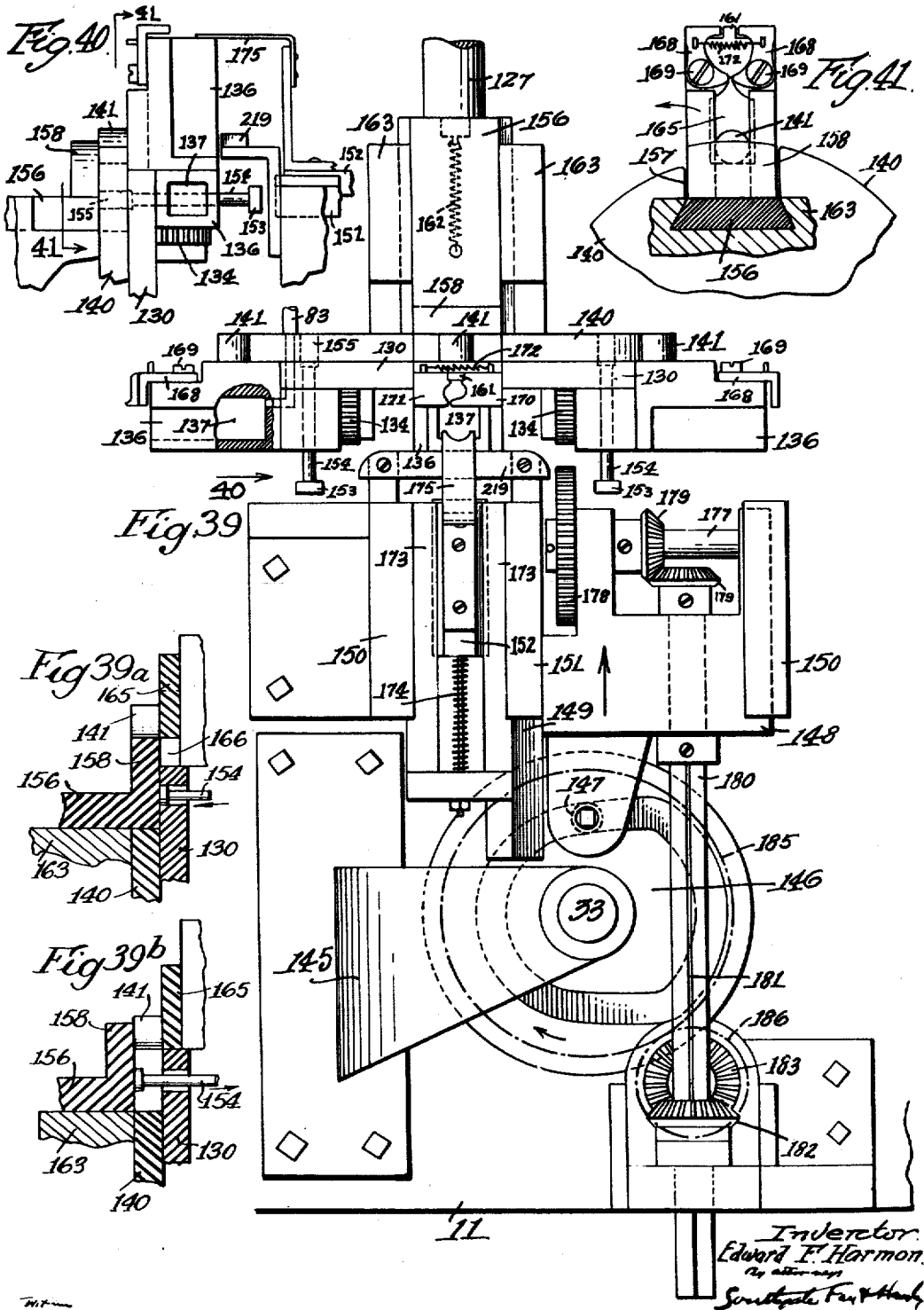
E. F. HARMON

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MACHINE FOR PACKAGING TOOTH BRUSHES

Filed Dec. 13, 1935

12 Sheets-Sheet 10



Nov. 8, 1938.

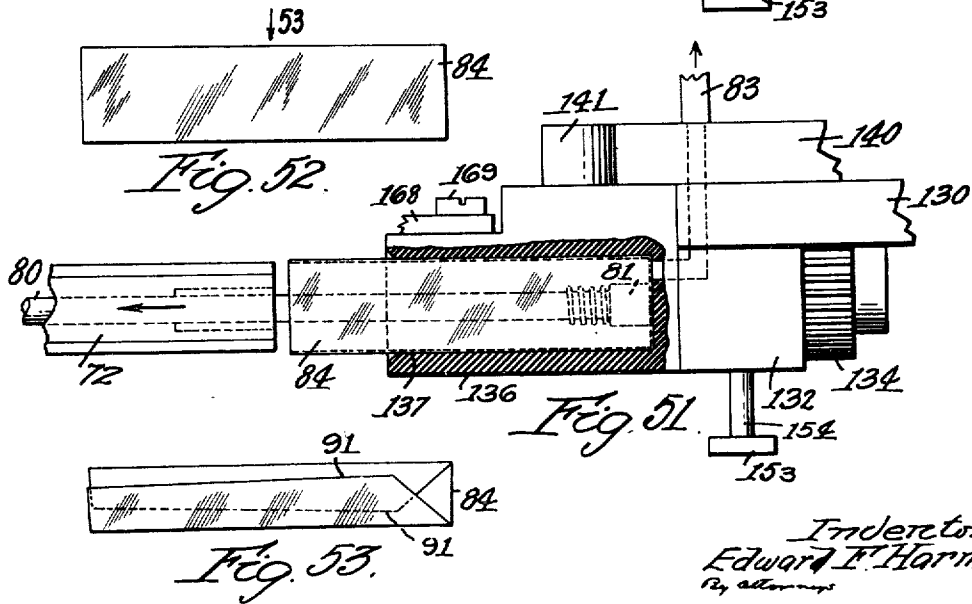
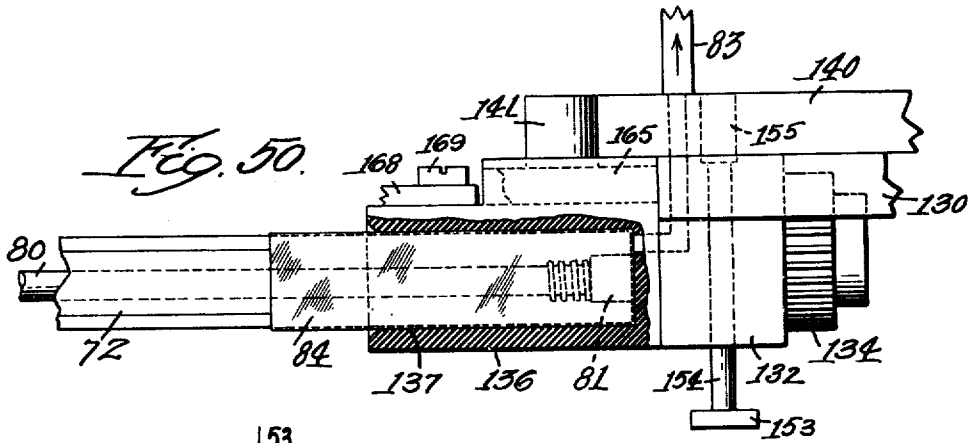
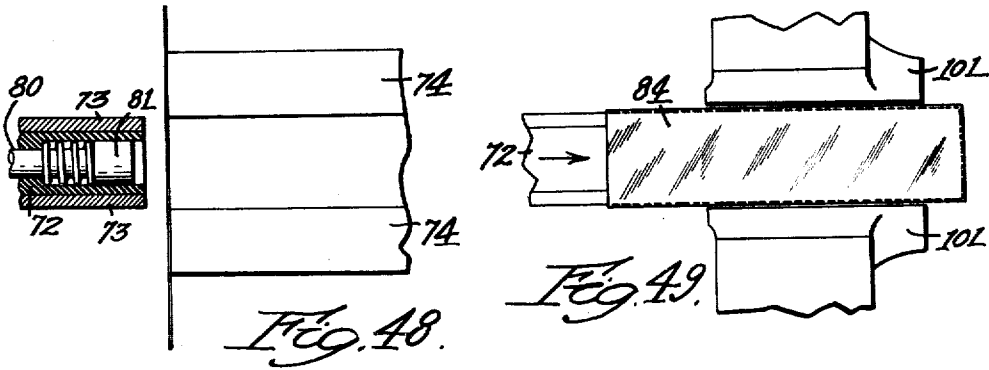
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MACHINE FOR PACKAGING TOOTH BRUSHES

Filed Dec. 13, 1935

12 Sheets-Sheet 11



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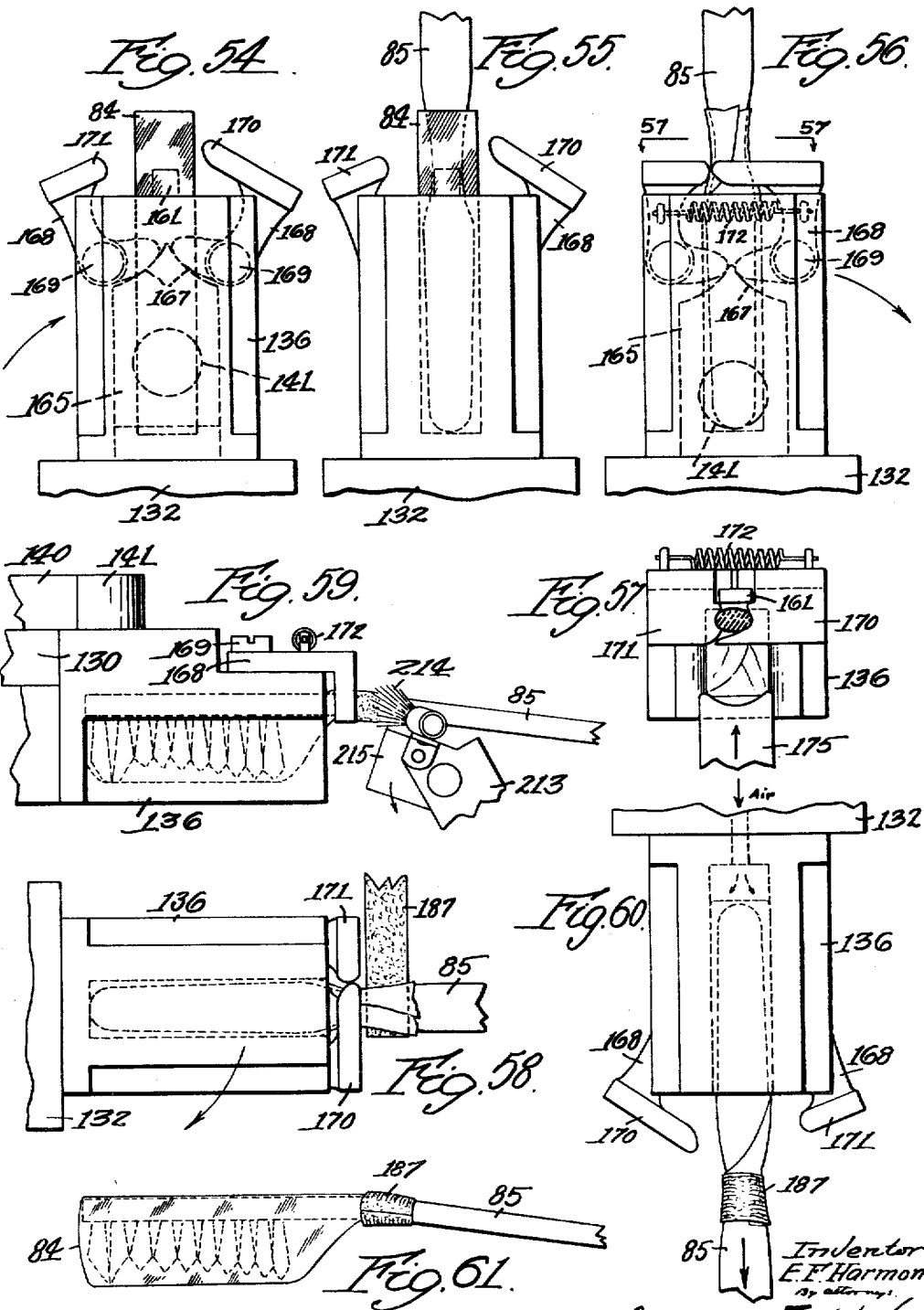
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MACHINE FOR PACKAGING TOOTH BRUSHES

Filed Dec. 13, 1935

12 Sheets-Sheet 12



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UNITED STATES PATENT OFFICE

2,135,751

MACHINE FOR PACKAGING TOOTH
BRUSHES

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& Company, Wilmington, Del., a corporation
of Delaware

Application December 13, 1935, Serial No. 54,301

31 Claims. (Cl. 93—3)

The principal objects of this invention are to provide for the packaging of a toothbrush or other brush by encasing the bristles in an envelope of cellulose, waterproof paper or the like; to provide for forming the said envelope by running a sheet of the cellulose material along a path, pushing it through a die or the like by means of a plunger, holding it in its extreme position, sealing its side edges, after the brush is inserted, forming the neck of the envelope around the shank of the toothbrush handle, and sealing it; to provide for sealing the sides of the package by means of heat in a very simple and convenient way involving no loss of time; to provide for bringing the said envelope or package into vertical position with its open mouth at the top and introducing the bristle end of a brush into it automatically; to provide for bringing plungers and the like up against the open end of the bag and pressing them against the handle so as to get a preliminary seal; to provide for rotating the brush in this position on its own axis and bringing tape of cellulose, or other material, having one side sticky, into contact with the rotating brush so as to wind a strip of this material around the brush to hermetically seal it; to provide a storage for the sealing tape in the form of a rotary reel having a series of rolls thereon arranged tangentially and each one of them being adapted to apply a piece of the sealing tape to the brush and package as the seal moves around and as the brush rotates; to provide means for feeding the brushes into the machine and guiding them into the open tops of the envelopes, and to provide a machine which will operate automatically and continuously to turn out great quantities of brushes having the bristles located in envelopes of "Cellophane" or the like and hermetically sealed and a new method of so sealing the bristles of the brushes.

Other objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawings, in which

Fig. 1 is a plan of a machine for encasing the bristles of a toothbrush in a package or envelope; Fig. 1^a is a plan of the drive for the feed rolls;

Fig. 2 is an elevation of the same, taken in the direction of the arrow 2 in Fig. 1;

Fig. 3 is an elevation looking at the machine in the direction of the arrow 3 in Fig. 1;

Fig. 4 is a horizontal sectional view of the mechanism on the line 4—4 of Fig. 2;

Fig. 5 is a plan on enlarged scale of the driving mechanism;

Fig. 6 is a plan of the auxiliary drive for the turret, reel drive, slide drive and power drive, with the shafts in section;

Fig. 7 is a sectional view on the line 7—7 of Fig. 5;

Fig. 8 is an elevation of part of the conveyor drive;

Fig. 9 is an elevation of the brush feeding-in mechanism;

Fig. 10 is a plan of a part of the auxiliary drive for the turret;

Fig. 11 is an end view of the same as indicated by the arrow 11 in Fig. 10;

Fig. 12 is a plan of the feeding-in chute for the brushes as indicated by the arrow 12 in Fig. 9;

Fig. 13 is a similar view of the brush tilting means, taken in the direction of the arrow 13 in Fig. 9;

Fig. 14 is a plan of the lower part of the guide for the brush, taken in the direction of the arrow 14 in Fig. 9;

Fig. 15 is an elevation taken in the direction of the arrow 15 in Fig. 1;

Fig. 16 is a sectional view on the line 16—16 of Fig. 15;

Fig. 17 is a plan of the guide for the "Cellophane" on the line 17—17 of Fig. 15;

Fig. 18 is a plan of the feed rolls as indicated by the arrow 18 in Fig. 16;

Fig. 19 is a sectional view on the line 19—19 of Fig. 15, showing the cutting knife and stop;

Fig. 20 is a plan of a conveyor for removing the brushes after they have been encased and sealed;

Fig. 21 is a plan of the feed rolls and their operating mechanism;

Fig. 22 is a part plan of the means for forming the envelope or package with parts in section;

Fig. 23 is a sectional view on the line 23—23 of Fig. 22 showing the end elevation of Fig. 3;

Fig. 24 is a plan of the means for operating the sliding rod in Fig. 22;

Fig. 25 is a sectional view on the line 25—25 of Fig. 3;

Fig. 26 is a plan of the former and heating units, partly in section;

Fig. 27 is an end elevation thereof, looking in the direction of the arrow 27 in Fig. 26;

Fig. 28 is a transverse sectional view on the line 28—28 of Fig. 26;

Fig. 29 is a side view of the envelope former;

Fig. 30 is an end view of the same, as indicated by the arrow 30 in Fig. 29;

Fig. 31 is a sectional view of the same on the line 31—31 of Fig. 29;

5 Fig. 32 is a view similar to Fig. 29 with the shaping former removed;

Fig. 33 is an end view thereof looking in the direction of the arrow 33 in Fig. 32;

Fig. 34 is a plan of said former;

10 Fig. 35 is a side view of the turret, showing a tape roll but no brushes;

Fig. 36 is a sectional view on the line 36—36 of Fig. 35;

Fig. 37 is a plan showing the connection between the auxiliary drive for the turret and the turret shaft;

Fig. 38 is a sectional view on the line 38—38 of Fig. 37;

Fig. 39 is a plan of parts of the machine showing the slide operation; Figs. 39^a and 39^b are sectional views showing the parts in two different positions.

Fig. 40 is an elevation in the direction of the arrow 40 of Fig. 39;

25 Fig. 41 is a sectional view on the line 41—41 of Fig. 40;

Fig. 42 is an elevation of the brush mechanism and operating parts for laying down the sealing tape;

30 Fig. 43 is a sectional view on the line 43—43 of Fig. 42 showing the gearing;

Fig. 44 is a sectional view on the line 44—44 of Fig. 42 showing the tape roll cam;

Fig. 45 is an elevation of one of the tape rolls;

35 Fig. 46 is an elevation of the same as indicated by the arrow 46 in Fig. 45;

Fig. 47 is a sectional view on the line 47—47 of Fig. 46;

Fig. 48 is a plan of the former;

40 Fig. 49 is a plan of the heating unit;

Fig. 50 is a plan, with parts in section, showing the completion of the envelope or package;

Fig. 51 is a similar plan showing the envelope completed and the slide withdrawn;

45 Fig. 52 is a side view of the envelope;

Fig. 53 is an edge view thereof;

Fig. 54 is a side view of the levers for forming the end of the package or envelope;

50 Fig. 55 is a similar view showing the brush in the envelope;

Fig. 56 is a similar view showing the levers moved together to their final position for shaping and closing the open end of the envelope;

55 Fig. 57 is a sectional view on the line 57—57 of Fig. 56;

Fig. 58 is an elevation of the parts shown in Fig. 56 with the turret rotated 90° and illustrating the tape in position and just ready to be wound on to complete the package;

60 Fig. 59 is an elevation of the same parts showing the sealing operation completed and the cut-off knife acting to separate the sealing tape;

Fig. 60 is a view showing the completion of the operation and indicating the air admitted to help release the package from the turret, and

65 Fig. 61 is a side view of the completed brush.

This invention is designed to employ a web of "Cellophane" or other such material for packaging toothbrushes and other brushes. Cellulose derivatives including esters and ethers and even translucent and opaque materials can be used. A roll of such material is supported in the proper position and the material is drawn from the roll, properly guided, and brought into a position in

75 which a plunger can force a separated sheet of

the material into a specially designed former to produce a package or envelope for receiving the bristles of the brush. This envelope is formed so that it preferably is rectangular in cross section and the edges are sealed by heat. The envelope 5 is located in a position with its open end up and toothbrushes are fed along a course and each one brought down into one of these envelopes with the bristle end down. Then the envelope 10 is closed at its open end around the shank of the brush. Finally it is turned on its axis with a piece of cellulose or other tape sticking on one side and engaging it at its forward end. This results in the wrapping of the sticky tape around the closed end of the envelope and the hermetic sealing of 15 the package. The tape is fed from a reel carrying a plurality of rolls of tape, the action being automatic so that each roll as it passes a certain point will feed a length of tape to a rotating brush. Then the tape is cut off and the brush moved 20 along and the next roll of tape moved up to the same position. This furnishes a brush, preferably a toothbrush, with an envelope surrounding the bristle end of it and hermetically sealed.

The machine is driven by a motor 10 mounted 25 on a frame 11. On the shaft of this motor is a pulley 12 which, by a belt or the like, drives an air pump 13. The pulley 12 is on the motor shaft 14 which carries a worm 15 driving a worm wheel 16 on a shaft 17. This shaft is provided with a 30 sliding clutch 18 operated by hand through a lever 19. Whether the shaft is connected up or not, through the clutch, a sprocket wheel 20 on the shaft 17 through a chain 21 drives a shaft 22 above. This shaft 22, through spiral gears 23, 35 or the like, drives a shaft 24 through a sprocket wheel 25 which drives the delivery conveyor chain 26.

When the clutch 18 is closed the shaft 17 drives a sliding bar cam 27 and a pair of spiral gears 28, 40 which in turn drive a shaft 29. This shaft 29 at a higher level, through a pair of bevel gears 30, drives a horizontal shaft 31. This shaft 31 through bevel gears 32 drives a shaft 33 for operating certain slides in the machine, as will appear later. Also through bevel gears 34 and the shaft 31 is driven a shaft 35. This shaft through bevel gears 36 drives a shaft 37 for operating a reel for carrying the sealing tape. The shaft 35 through 45 bevel gears 38 drives a horizontal shaft 39 which, through bevel gears 40, drives a vertical shaft 41 constituting the auxiliary drive for the turret. The shaft 39 has a handle 42 thereon through which all the mechanism from this hand wheel back to the cam 27 can be operated by hand 55 when the clutch 18 is opened but not when it is closed. Of course, it is understood that where bevel gears and spiral gears are mentioned the various drives can take place through any equivalent mechanism.

The shaft 29 is provided with Geneva motion 60 107, like that shown in Figs. 37 and 38, for driving a parallel shaft 44 intermittently and providing a quick action when the shaft 44 is turning. This is done so that the web can be 65 cut into sheets at each dwell of the web. The shaft 44 is shown as having a bevel gear 43 driving a bevel pinion 47 on a feed roll shaft 48, as shown in Figs. 3, 24 and 21. On the shaft 48 is a gear 49 meshing with a companion gear. 70 These two gears are mounted on parallel shafts which carry a pair of circumferentially grooved feed rolls 50 and 50^a. One of these is of metal and the other of rubber.

A web of "Cellophane" or the like is stored on

a roll 108 which has axial handles 109 by which it can be lifted and placed in open topped bearings 110. This roll is free to rotate but is supplied with an adjustable brake 111. These feed rolls are for the purpose of drawing the web over a roll 51 on a shaft 52 carried by a bracket on the frame. The web passes through a guide and tensioning device 53 which comprises a bracket 54 carried in stationary position and a pivoted plate 55 which is latched in place by a latch 56. Both this guide and the bracket are provided with projecting ribs 57 which do not quite touch but serve to provide a little tension for the web. This guide guides the web between two series of vertical rods 58 located in grooves in the feed rolls which keep the web in place while it is passing downwardly. The feed rolls are arranged so that they engage the web lightly but sufficiently to feed it. The guide rods 58 are carried by supports 59 on one of two former frames 61. The web is fed down in front of a stationary plate 62 intermittently. The shaft 29 carries a gear 45 constantly driving a sleeve 112, loose on the shaft 44, through a gear 46 (Figs. 3 and 24). As the web comes down through the guides 58 it is cut off, at each dwell, into equal sheets by a pivoted knife blade 65 cooperating with a second cutting surface and operated by a cam 66 on the sleeve 112. When the cam is out of operation a spring 67 brings the knife blade back against an adjustable stop 68.

The plate 62, against the front of which the severed sheet of "Cellophane" or the like is brought from the guides 58, is provided with a shield 70 having a vertical slot 71 therein. A sliding bar 72, provided with smooth sides 73, is pushed in through the slot 71, which has an enlarged portion through the center to receive the bar 72. The sliding bar 72 is held by an upright 60 on a slide 67^a which runs in ways carried by the frame. The slide, upright, and bar are reciprocated by a lever 68^a which is operated by the sliding bar cam 27 and cam roll. This cam is located on the shaft 17. The slide 72 has a head 72^a which is held yieldingly against a stop by a spring 75.

On the sleeve 112 is an envelope holder cam 76. This operates a lever 77 having an end 78 which engages a head 79 on a spring-pressed rod 80 and moves it as indicated in Fig. 24. A spring 82 retracts the rod 80. This rod has a head 81 on the end and it is located inside the sliding bar 72 so as to move with it except when operated separately by the lever 77. The purpose of this construction is to allow the sliding bar 72 to move inwardly through the enlarged part of the opening 71 and engage the center of the severed sheet of "Cellophane" and push the sheet into the formers 74. The general purpose of this action is to form the sheet of "Cellophane" into an envelope 84 or package in which is to be inserted the bristle end of the brush 85.

The head 81 will engage the bottom of said envelope and push it and hold it in position under spring pressure. Thus, when the sliding bar 72 starts to withdraw by action of the cam 27, the end of the envelope will be held at its extreme position for a short time and not be pulled out with the sliding bar. This is indicated in Figs. 50 and 51. At this time the pump 13 is operating and exerting a suction through a tube 83 against the end of the envelope 84, thus continuing to hold the end of the envelope in the position shown in Fig. 51 after the sliding bar is entirely removed.

It will be seen, by reference to Fig. 53, how the edges of the sheet are overlapped. The part between the full and dotted line has to be sealed. For this purpose the former frame 61 is made of two parts spaced apart and separated along their sides by two channel shaped former casings 87. The former frames 61 are clamped together by clamps 88 which are held by screws and can be removed easily for readjusting the parts supported and held between these plates. The 10 frames 61 have recesses for receiving the two rectangular former casings 87 which are closed at the outer side and open at the inner. The two former casings are shaped to receive the opposite edges of the sheet of which the envelope 15 is made.

One of these former casings and contents is shown in Figs. 29 to 34 inclusive. In each casing 87 a main member 90 extends from one end to the other. It has a curved and varying surface 92 along which the "Cellophane" or the like is shaped. It also has at the bottom at the inside a member 93 spaced to provide a passage 94 for the "Cellophane". On the side is a forming member 95 spaced from the member 90 and the member 93 by a channel 96. The main member 90 is secured to its casing 87 by screws 97 and the member 93 is secured to the casing 87 by screws 98. The forming member 95 is secured to the back of the casing 87 by screws 99. 30

The rectangular sheet of "Cellophane" or other material is doubled over the sliding bar 72 with its longitudinal edges at first projecting. As it goes through the former these edges are turned inwardly toward each other by surfaces 100 on the two forming members enclosed in the casing 87. One of these edges passes through the channel 96 and the other in the channel formed by the varying surfaces 92. These two edges 91 overlap each other on both edges of the envelope as indicated in Fig. 53. The sides of the rectangular envelope 84 are left flat, as shown in Fig. 52. The edges 91 ride along the surface of the forming member 95 and form a pair of flaps, as indicated in Fig. 53. One flap is held in position by being forced under the member 93 which terminates short of the bottom of the end of the forming member and the other is held in the channel 96 so that the first named flap will be back of it. The result is an envelope having two opposite edges folded as shown in Fig. 53. These flaps can be sealed together by heat, if "Cellophane" is employed, or by an adhesive.

In the present case the flaps are shown as sealed by heat through the operation of a pair of heating units 101, as shown in Fig. 49. The heating units 101 are each mounted at the end of the former on a depending arm 102 pivoted at 103. Each arm is urged by a spring 106 toward the former and positively adjusted by screws and nuts 104 supported by the arms 102. A guard 105 protects the roll of "Cellophane" or the like from the heat.

When the sliding bar has reached the end of its motion it has straightened out the envelope and left it in the condition shown in Fig. 51 and it is held there when the sliding bar is withdrawn in the manner that has been described above.

Thus the envelope is left in a pocket formed in a radial casing 136 of a turret 130 rotatable on a horizontal axis. The turret auxiliary drive shaft 41, by means of bevel gears 120, drives a shaft 121 on which is a disc 122 having a roll 75

123 and a second disc 124 having a generally cylindrical outline and constituting a part of a Geneva motion. The roll 123 enters radial notches 125 in a disc 126 on the shaft 127 of the turret. The circumference of the disc 124 engages concave surfaces 129^a on a wheel 129 also fixed to the shaft 127. This constitutes the remainder of the Geneva motion. The disc 124 has a notch 128 to permit the intermittent rotation of the wheel 129.

It will be seen that the constant rotation of the shaft 121 with its discs results in rotating the disc 126 and therefore the shaft 127 intermittently through a quadrant, in the form shown. Then the disc 124 holds the wheel 129 in the stationary position until the roll 123 runs into the next notch 125. At that time the wheel 129 is released and allowed to rotate by the shaft.

On the shaft 127 is a turret 130 which has, in this case, four radially arranged spaces or cut-outs 131 for receiving certain mechanism. Also on this turret in bearings 132 are mounted four shafts 133. Each of these shafts has a gear 134 for operating it as will be described. Each of them is provided with a radially projecting casing 136 which contains a radial pocket 137 into which the envelope 84 is projected by the sliding bar 72 which has been described.

It will be remembered that the envelope is pushed into the pocket in horizontal position, as shown at the left in Fig. 35, and that it is held by suction through the pipe 83. This suction is kept up until the turret starts to rotate a quarter revolution and, by means not shown, is then disconnected. The first quarter revolution of the turret brings the casing 136 to the top of the turret where it stands vertically, as shown in Fig. 35. At this time one of the toothbrushes is brought down into it through a chute 138 in a way that will be described later. The brush falls to the bottom of the envelope in the pocket and certain actions are performed on it. After this is done the turret rotates another quarter revolution to bring it into horizontal position where the operations on the brush are completed. At the end of the third rotation of the turret the casing 136 is brought to the vertically downwardly extended position and the brush drops out of it on the discharge conveyor 250 (Fig. 20).

On the same axis as the turret is located a stationary edge cam 140. Throughout more than a quarter of the circumference of the cam is the low part and the rest of it is made up of the high part which extends to the outgoing side of the casing 136 in its uppermost position. This cam is designed to control in part the operation of a roll 141.

On the shaft 33, (see Fig. 39) which is supported at one end by a bracket 145 carried by the frame, is a cam 146. This cam operates a roll 147 which is connected with and operates a slide 148 supported in ways 149 and guides 150. This slide has connected with it, preferably integrally, a part 151 and a part 152 which slide with it. The part 151, which can be considered as a slide by itself, has the function of engaging heads 153 each carried by a pair of rods 154 arranged for each of the four quarters of the turret. Heads on the other ends of these rods pass through openings 155 in the stationary cam 140 to operate a slide 156 in a single opening 157 in the stationary cam. Normally the roll 141 is located in the plane of the cam. A spring 162 draws back the

slide 156 along its ways 163 after it has been actuated by the slide 151. This slide 156 has a projection 158 which normally supports the roll 141. When the slide 151 operates the rods 154 they push this slide 156 to the position shown in Fig. 40 and leave the roll 141 without support (as shown in Fig. 41) until it is supported on the surface of the cam 140 at the left. Therefore, the roll is controlled by that cam as the turret rotates. After being operated the head 153 is pulled back by a spring 160.

The rotation of the turret 130 about the axis of the stationary cam 140 from the position at the top of Fig. 35 to the right leaves the roll 141 in its low position (shown in Fig. 41) until the turret has rotated nearly 180° and then pushes it out during the rest of the rotation. The roll 141 is mounted on a slide 165 guided in ways. This slide has cam surfaces 167 which cooperate with a pair of levers 168 pivoted on centers 169 and having at their opposite ends forming surfaces 170 and 171 respectively.

It will be seen that, from the horizontal position at the left hand side in Fig. 35 up to the vertical position at the top, as shown in that figure, the roll 141 is raised to its extreme position and holds these two levers in the position shown in Figs. 54 and 55 where they are out of operative position. This roll stays on the cam all this time. It is only when it reaches its uppermost position that the action previously described takes place which moves it over, as shown in Fig. 41, off the projection 158 on the slide 156 and allows it to descend, thus bringing the levers inwardly to the position shown in Figs. 56 and 57. There the surfaces 170 and 171 are drawn together by a spring 172. The effect of this is to force inwardly the opposite sides of an envelope surrounding the bristle end of the brush. This is shown in Fig. 57 and the shapes of the two surfaces 170 and 171 are in part complimentary so as to bring the open end of the envelope against and around the shank of the brush on opposite sides.

The slide or part 152 is mounted in ways 173 on the slide 148 and cushioned by a spring 174 but otherwise moves with the slide 148 up to a stop 219. On the slide 152 is a shaping head 175 which finally acts against the shank of the brush to push the "Cellophane" or the like of the envelope on the bristle side of the brush back against the shank to complete the operation of closing the envelope temporarily about the shank. During this operation the brush is held back against a stop projection 161 on the casing 136. The way of getting the brush and the envelope into the casing 136 from the brush chute 138 will be described later.

Mounted on the slide 148 is a shaft 177 having upon it a gear 178 for meshing with the gears 134 on the several heads of the turret in order that the brush may be turned. By gears 179 this shaft 177 is driven from a shaft 180 which is slidably connected by a spline 181 to a driving gear 182 which in turn is driven by a gear 183 on a shaft 184. The shaft 184 is driven from the shaft 33 by gears 185 and 186. The purpose of this last feature is to drive the gear 178 and, when that gear is in mesh with one of the gears 134, to rotate the brush and its envelope on the longitudinal axis thereof for the purpose of winding around it a tape 187.

The shaft 37 (see Fig. 42) is provided for rotating a reel which carries the rolls of cellulose or other adhesive tape for hermetically sealing the brush package. For that purpose the shaft 37 75

is provided with a gear 190 which meshes with a gear on a shaft 191 carrying a mutilated gear 192. This gear 192 has two or three teeth at one point in its circumference and it drives a gear 193 which has corresponding teeth equally spaced around its circumference, in this case in ten groups. Therefore, one rotation of the shaft 37 rotates the gear 193 one tenth of a revolution. This gear is mounted on a shaft 194 supported by the frame of the machine and carrying a bearing 195. This bearing is really a friction cylinder and is surrounded by a felt bushing 196 to apply friction. This bushing is supported in a strap 197, preferably of metal, secured to a bracket 198 on a cross brace 199 which extends across the machine. Below the cross brace the shaft 194 carries a circular plate 200 which constitutes a reel. This plate is reinforced by metallic braces 201 and carries a series of ten vertically depending arms 202. Each arm at the bottom carries a radial shaft 203 having a roll 204 (Fig. 47) and also carrying a tape drum 205 on which is wound a tape which may consist of any suitable material with adhesive on one side but a cellulose tape is very suitable. This tape projects from its drum down past a guide roll 206 supported on a bracket 202^a. In each arm 202 is a slot 207 in which the shaft 203 is adapted to be moved up and down. The tape drum 205 on which the tape is wound is provided with pins 209 which pass through circumferential slots 211 on an outside plate 210 for protecting the roll of tape. One of these pins is provided with a head and is adapted to enter an enlarged opening 211^a at the end of one of the slots 211 in the plate 210 so that this plate can be removed by turning it slightly. It is shown separated in Fig. 47.

On the shaft 37 is a cam 212 which, on each rotation of the shaft, raises one of the rolls 204 and the tape drum 205. The slot 207 is provided to allow this action to take place. On this cam is a bracket 213 which supports a brush 214 and a knife 215 which is adapted to cut off the tape. This brush wipes the severed end of the tape down on the shank of the tooth brush. Another brush 216 is also mounted on an arm on the shaft 37 and moves the tape into contact with the tooth-brush package.

The brushes which are to be packaged or sealed with their bristles in the envelope, the manufacture of which has been described, are brought in by any ordinary endless conveyor 220 having projections 221 for engaging the bristles at the lower end and carrying the brushes up to a guide 222. This guide consists of two separated rails inclined in such a way that when the brush drops off the conveyor 220 over its upper guide wheel 223 they will fall into this guide and be carried down by gravity.

At a point along the guide the sliding motion of the brushes down the guide is interrupted by a pair of alternately moving stops 224. These stops reciprocate in one of the rails and across the guide. They are connected with an oscillating lever 225 which is operated by a slide 226. This slide reciprocates in a guide 227. On the shaft 121 is a trip cam 228 which forces forward the slide 226. After the cam has moved, a spring 229 restores it and its cam roll 231 to retracted position.

The slide 226 has a pin 232 entering a slotted reciprocating bracket 234 and moves with it a vertical rod 235 carried by said bracket. This rod 235 through universal joints 236, oscillates a shaft 237 which carries the lever 225. This re-

ciprocates the two stops 224 alternately and stops each brush at this point. As each brush is released from these two stops it moves by gravity down to the position shown in Fig. 9, at which point the lower end of the handle of the brush enters a trough 240. This trough has a stopping surface 241 which prevents this end of the brush moving further. The brush swings down and falls off the end of the rails 222 and necessarily tips over into the position shown in dotted lines in Fig. 9.

The brush enters a guiding device 242 which has a front door 243 latched in position by a latch 244. In tipping over the brush hits a spring 245 to check its motion and enters between a pair of converging walls 246. At the bottom of this hopper formed by these walls is a vibrating stop 247 actuated by the rod 235 on which it is mounted. This stop is for the purpose of preventing more than one brush starting down into the brush chute 138 together. This chute is made very much like the hopper having two doors 248 in front and two walls 249 between which the brushes have to pass. As shown in Fig. 35 this chute 138 directs the brushes into one of the casings or pockets 137 in the turret.

It will be seen that this machine takes a continuous strip of sheet material, of which the envelope is to be made, feeds it down in front of an opening, and cuts it off into separate rectangular sheets. The sliding bar pushes this sheet through an opening at the front of the former, doubling the sheet over the end of the bar and leaving the four opposite edges projecting at opposite sides of the bar. This sheet is fed through the former which is so shaped that these projecting edges are bent inwardly on the two opposite sides of the bar to overlap each other and form two sides of the envelope. These projecting edges are sealed together by heat, adhesive, or other means. An envelope is formed having a rectangular bottom and four sides, two of the sides being of a single thickness of the material and the other two comprising overlapping edges.

The sliding bar with the envelope upon it moves horizontally through the heating units 101 into the pocket 137 shown at the left in Fig. 35. The pocket in which it is left practically constitutes one of the arms of a turret which rotates, in the form shown, on a horizontal axis, the pockets projecting from it radially.

A tooth or other brush is fed up by the conveyor, hanging by gravity from its bristle end, and reversed into the hopper which feeds it by gravity down into the envelope which now is in vertical position with its open end up.

The rotation of the turret causes the slide to move in the proper order to hold the pair of levers away from the brush and the envelope. After further rotation, the slide is moved so that its spring will bring these two levers together and press the open part of the envelope about the shank. Another slide moves sideways and up against the shank of the brush and presses the parts of the envelope that project against the shank of the brush to cause the envelope to be carried about said shank ready to be sealed.

Now the reel rotates a quarter of a revolution with the brush sticking out radially. At this time the mechanism described operates to rotate the pocket and brush with the envelope between them. The reel for holding the sealing tape now comes to sealing position with one of the rolls of tape having its free end hanging down. One side of the tape is softened or otherwise made sticky

and adhesive. The rotation of the brush with the hanging down end of the tape engaging it will wind up the tape on the shank of the brush and around the open end of the envelope, which has been crimped or folded against the shank, to seal the package.

This furnishes a hermetically sealed package around the bristles of the envelope. The packaged brush is dropped from the pocket, in its downwardly projecting position, on the discharge conveyor 250. This discharges the packaged brush from the machine.

Having thus described my invention and the advantages thereof, I do not wish to be limited to the details herein disclosed, otherwise than as set forth in the claims, but what I claim is:—

1. The combination with a pocket open at the end, of a sliding bar movable into said pocket, a former through which the sliding bar moves for folding a piece of sheet material into the form of an empty envelope or package around the end of the sliding bar, and pneumatic means for holding the envelope by the bottom outside surface thereof and preventing removal from the pocket by the removal of the sliding bar.

2. A forming member for making an open ended bag from a sheet larger than the forming member and centered thereon comprising a casing, a member therein having a surface extending from one extreme corner to the opposite side of the casing at a distance from the open side of the casing, a second member located along one side of the casing and having a curved surface on the outside gradually changing from the entrance end toward the other end and terminating short of the opposite end of the casing, a third member having a curved gradually diminishing surface along the inside, terminating short of the end of the second named member, the spaces between these said members constituting means for assisting in forming the edges of the sheet and overlapping them so that they may be secured together to produce an envelope, and a plunger for cooperating with said members.

3. A forming member for making an open ended bag from a sheet larger than the forming member and centered thereon comprising a casing, a member therein filling the bottom of the casing from one end to the other and having a surface extending from one extreme corner to the opposite side of the casing at a distance from the open side of the casing, a second member located along one side of the casing and having a curved surface on the outside and a curved surface on the inside gradually changing from the entrance end toward the other end and terminating short of the opposite end of the casing, a third member extending from the bottom of the casing to its open side at one end and having a flat surface on the outside and a curved gradually diminishing surface along the inside, terminating short of the end of the second member and a plunger adapted to be inserted in said members to press the sheet against them.

4. The combination of a casing having an open-ended pocket having a closed bottom, means for inserting an envelope having a closed bottom in said pocket with one end of the envelope projecting and the closed bottom touching said bottom of the pocket, means for inserting the bristle end of a tooth brush into said envelope to touch its bottom, and means for closing said projecting end of the envelope about the shank of the tooth brush.

5. The combination of a casing provided with

an open ended pocket and a closed bottom, means for introducing an envelope into said pocket with the open end of the envelope projecting therefrom, means for introducing the bristle end of a brush into said envelope, and means for thereafter pressing the side of the envelope against the shank of the brush.

6. The combination of a casing provided with an open ended pocket, means for introducing an envelope having an open end and a closed bottom into said pocket with the open end of the envelope projecting therefrom, means for introducing the bristle end of a brush into each envelope, means for thereafter pressing the sides of the envelope against the shank of the brush, and means for pressing the front of the envelope back against the front of the shank of the brush to complete the folding of the mouth of said envelope about the brush shank.

7. The combination of a support provided with a series of rotary casings each having a pocket therein, means for rotating said support intermittently, means for introducing an envelope into each pocket when it is in one position, means for introducing the bristle end of a tooth brush into each envelope when the casing is in another position, levers having ends for compressing the envelope and forming it about the shank of the tooth brush, and a cam for controlling the operation of said levers as the support rotates.

8. The combination of a turret provided with a series of rotary radial casings each having a pocket therein, means for rotating said turret on a horizontal axis, means for introducing an envelope into each pocket when it is in horizontal position, means for introducing the bristle end of a tooth brush into each envelope when the casing is in vertical position, a cam adjacent to the turret having its low side occupying a space at one side of the cam, a series of slides on the turret movable radially with respect to the turret, rolls located on said slides and normally engaging the surface of said cam to be actuated thereby, and levers having ends for compressing the envelope and forming it about the shank of the tooth brush carried in position to be operated by each of said rolls.

9. The combination of a turret rotatable on a horizontal axis, radial means carried by said turret for receiving and holding tooth brushes and an envelope for every tooth brush, with a cam adjacent to the turret having an opening therethrough at the point of change from the high side of the cam, a member registering with the high side of the cam and movable with respect to the turret, a roll adapted to be supported by the cam, a slide radially mounted with respect to the turret on which the roll is mounted, means for moving the roll off the surface of the cam, means for moving the radial slide, and means for actuating the controlling means when the radial slide is retracted.

10. The combination with a turret rotatable on a horizontal axis and having means radially extending therefrom for supporting brushes and envelopes enclosing the brushes, of a cam adjacent to the turret, said cam having an opening, a member adapted to be received in said opening and having a surface constituting a continuation of the high surface of the cam, a slide radially mounted on the turret, a roll on said radial slide and normally resting on the surface of said cam, a movable slide in said opening for moving said member out of registration with the cam, thereby allowing said roller to move inwardly, yielding

means for moving the roll inwardly, and means operated by the slide for compressing the envelope around the brush.

11. A turret for the purpose described comprising a series of projecting casings each having a pocket for an envelope and a brush, a slide on the turret, means operated by said slide for controlling the operation of compressing the envelope about the shank of the brush, a second slide mounted slidably and yieldably on the first one and having means for compressing and shaping the envelope at the front of the shank of brush, and a cam for operating the first-named slide.

12. The combination with a rotatable turret having a series of radial openings therethrough, of casings projecting from said openings each having a pocket for receiving an envelope and a brush, a bearing in each opening for one of said casings, a gear on the casing, a gear in position to engage the gears on the casings in order as the turret rotates, and means for rotating the last-named gear to rotate the casings on their own axes.

13. A rotatable turret for the purpose described comprising a series of radially projecting casings each having a pocket for an envelope and a brush, a slide on the turret, means operated by said slide for controlling the operation of forming the envelope about the shank of the brush, a second slide on the first slide having means for compressing and shaping the envelope at the front of the shank of the brush, a cam for operating the first-named slide, and means carried by the first named slide for rotating said casings one by one as they come into a certain position.

14. The combination of a casing having a pocket, means for inserting a previously formed open envelope in said pocket with the open end of the envelope projecting therefrom, means for locating said pocket in a position for receiving the bristle end of a brush therein, means for closing the open end of the envelope about the brush and against the shank thereof, and means for rotating the pocket, envelope, and brush on an axis.

15. The combination of a casing having a pocket, means for inserting a previously formed envelope in said pocket with the open end of the envelope projecting therefrom, means for locating said pocket in a position for the open end of the envelope to be at the top so that it is adapted to receive the bristle end of a tooth brush therein, means for closing the open end of the envelope about the tooth brush and against the shank thereof, means for rotating the pocket, envelope, and tooth brush on an axis, and means for moving said casing laterally.

16. The combination of a casing provided with a pocket therein for receiving an envelope and a tooth brush in the envelope, means for pressing in the sides of the envelope against the shank of the tooth brush, means for pressing in the front of the envelope against the front of the shank of the tooth brush, means for rotating the pocket, and means for introducing a sticky tape into engagement with the pressed-in parts of the envelope, whereby the rotation of the tooth brush and envelope will wind the tape thereon.

17. The combination of a casing provided with a pocket therein for receiving an envelope, means for locating said pocket with its open end up, in position to receive by gravity the bristle end of a tooth brush in the envelope, means for moving the casing, envelope, and tooth brush from vertical to horizontal position, means for rotating

the casing, envelope, and tooth brush on a horizontal axis in that position, and means for introducing a sticky tape into engagement with the envelope, whereby the rotation of the tooth-brush and envelope will wind the tape thereon and seal the envelope to the toothbrush handle.

18. The combination of a casing provided with a pocket therein for receiving an envelope, means for locating said pocket with its open end up in position to receive by gravity the bristle end of a tooth brush in the envelope, means for pressing in the sides of the envelope at the top against the shank of the tooth brush, means for pressing in the front of the envelope against the front of the shank of the tooth brush, means for moving the casing, envelope, and tooth brush from vertical to horizontal position, means for rotating the casing, envelope, and tooth brush on a horizontal axis, and means for introducing a sticky tape into engagement with the pressed-in part of the envelope, whereby the rotation of the tooth brush and envelope will wind the tape thereon.

19. The combination of a casing provided with a pocket therein for receiving an envelope, means for rotating the casing, and means for introducing a sticky tape into engagement with the envelope, whereby the rotation of the envelope will wind the tape thereon.

20. The combination with a turret having casings, each casing provided with a pocket therein for receiving an envelope therein, means for rotating the turret, means for rotating the casing on its own axis to rotate the envelope, a reel, a roll of sticky tape carried by the reel, and means for turning the reel to bring the tape hanging down from the roll into a position to engage the end of the envelope, whereby the rotation of the envelope will result in the winding of the tape thereon.

21. The combination with a turret rotatable on a horizontal axis and having casings radially projecting therefrom, each casing provided with a pocket therein for receiving an envelope with the bristle end of a brush therein, means for rotating the turret to present the casings in position for receiving the envelope and brush successively and then into a third position, means for rotating the casing on its own axis when in the third position to rotate the envelope and brush with it, a reel, rolls of sticky tape carried by the reel, and means for rotating the reel to bring the tape hanging down from one roll into a position to engage the end of the envelope, whereby, the rotation of the envelope will result in the winding of the tape thereon and the hermetic sealing of the envelope to the brush.

22. The combination with a casing provided with a pocket therein for receiving an envelope with the bristle end of a tooth brush therein, means for rotating the casing with the envelope therein on its own axis, a reel, rolls of sticky tape carried by the reel in tangential position and rotatable on radial axes, and means for rotating the reel intermittently to bring the tape hanging down from one roll into a position to engage the end of the envelope, whereby the rotation of the envelope will result in the winding of the tape thereon and the hermetic sealing of the envelope to the brush.

23. The combination of a disc rotatable on a vertical axis, a series of radial studs on the disc, rolls rotatably mounted on said studs for carrying a sticky tape with the end depending from the roll, a casing having a pocket therein pro-

vided with an envelope in the pocket, and means for rotating said casing on its own axis, whereby, when the tape is brought into contact with the envelope projecting from the pocket, the tape will be wound around the envelope.

24. The combination of a disc rotatable on a vertical axis, a series of radial studs carried by the disc, rolls rotatably mounted on said studs for carrying a sticky tape with the end depending from the roll, a casing having a pocket therein provided with an envelope in the pocket and a brush or the like projecting from the pocket, means for rotating said casing on its own axis, whereby, when the tape is brought into contact with the envelope projecting from the pocket the tape will be wound around the envelope, means for wiping down the tape about the envelope, means for cutting off the tape, and means for wiping down its end.

25. In a reel for the purpose described, the combination of a disc, a series of arms depending from the circumference of the disc, studs carried by said arms, a tape drum rotatably carried by each stud, said arms being provided with vertical slots in which the studs are adapted to rise and fall, and means below the studs for raising the said studs and its tape drum.

26. In a reel for the purpose described, the combination of a disc, a series of arms depending from the circumference of the disc, studs carried by said arms, a tape drum rotatably carried by each stud, and means carried below the studs for guiding the tape.

27. In a reel for the purpose described, the combination of a rotary disc, a series of arms depending therefrom, a stud carried by each arm, a tape drum rotatable on each stud, and a plate carried by the stud at its outer end for holding a roll of tape on the drum, said plate having means for detachably mounting it in position for the ready removal of the roll of tape.

28. In a reel for the purpose described, the combination of a disc, a series of arms depending from the circumference of the disc, studs carried by said arms, a tape drum rotatably carried by each stud, a cover plate for the tape drum hav-

ing circumferential perforations therethrough, one of them having an enlargement, and pins extending through said perforations, one of them headed, whereby, the plate can be removed readily by turning it.

29. The combination of a reel rotatable on a vertical axis, a driving shaft therefor, gearing connecting said shaft with the reel to cause an intermittent rotation of the reel, a cam on the driving shaft, a tape drum supported on said reel and adapted to turn on a radial axis, a brush carried by the cam in position for brushing down the tape at the end of its operation, means carried by the cam for cutting off the tape, and means operated by the cam for moving the tape drum.

30. A forming member for sheet material comprising a rear member having a front surface provided with a curved portion and with a flat portion at one extreme side thereof, a central front member having a central longitudinal rear surface curved so as to be spaced slightly from said curved part of said front surface to form a channel for receiving the edge of a sheet to be formed, and a side member opposite said flat portion and in the plane thereof and having a curved front surface spaced from said rear surface to form a second passage shaped and located to fold one of the free edges of the sheet so that one will be folded over the other as the sheet is fed longitudinally along said forming member.

31. The combination with a casing having an open ended pocket therein, of a parallel sided sliding bar movable into said pocket carrying an empty envelope or package closed on all sides and on one end and open at the other end, a cam operated rod movable through and supported in the sliding bar to the end thereof, a plunger within in the end of the sliding bar for engaging the closed end of the envelope, and a spring within the bar and bearing on the plunger, whereby, when the sliding bar is withdrawn, the plunger will still engage the closed end of the envelope for a short time to prevent the removal of the envelope with the sliding bar.

EDWARD F. HARMON.

CERTIFICATE OF CORRECTION.

Patent No. 2,135,751.

November 8, 1938.

EDWARD F. HARMON.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 6, first column, line 69, claim 4, after the syllable "jecting" insert therefrom; and second column, line 33, claim 8, after the word "turret" insert intermittently; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 31st day of January, A. D. 1939.

Henry Van Arsdale

(Seal)

Acting Commissioner of Patents.

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25. In a reel for the purpose described, the combination of a disc, a series of arms depending from the circumference of the disc, studs carried by said arms, a tape drum rotatably carried by each stud, said arms being provided with vertical slots in which the studs are adapted to rise and fall, and means below the studs for raising the said studs and its tape drum.

26. In a reel for the purpose described, the combination of a disc, a series of arms depending from the circumference of the disc, studs carried by said arms, a tape drum rotatably carried by each stud, and means carried below the studs for guiding the tape.

27. In a reel for the purpose described, the combination of a rotary disc, a series of arms depending therefrom, a stud carried by each arm, a tape drum rotatable on each stud, and a plate carried by the stud at its outer end for holding a roll of tape on the drum, said plate having means for detachably mounting it in position for the ready removal of the roll of tape.

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ing circumferential perforations therethrough, one of them having an enlargement, and pins extending through said perforations, one of them headed, whereby, the plate can be removed readily by turning it.

29. The combination of a reel rotatable on a vertical axis, a driving shaft therefor, gearing connecting said shaft with the reel to cause an intermittent rotation of the reel, a cam on the driving shaft, a tape drum supported on said reel and adapted to turn on a radial axis, a brush carried by the cam in position for brushing down the tape at the end of its operation, means carried by the cam for cutting off the tape, and means operated by the cam for moving the tape drum.

30. A forming member for sheet material comprising a rear member having a front surface provided with a curved portion and with a flat portion at one extreme side thereof, a central front member having a central longitudinal rear surface curved so as to be spaced slightly from said curved part of said front surface to form a channel for receiving the edge of a sheet to be formed, and a side member opposite said flat portion and in the plane thereof and having a curved front surface spaced from said rear surface to form a second passage shaped and located to fold one of the free edges of the sheet so that one will be folded over the other as the sheet is fed longitudinally along said forming member.

31. The combination with a casing having an open ended pocket therein, of a parallel sided sliding bar movable into said pocket carrying an empty envelope or package closed on all sides and on one end and open at the other end, a cam operated rod movable through and supported in the sliding bar to the end thereof, a plunger within in the end of the sliding bar for engaging the closed end of the envelope, and a spring within the bar and bearing on the plunger, whereby, when the sliding bar is withdrawn, the plunger will still engage the closed end of the envelope for a short time to prevent the removal of the envelope with the sliding bar.

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Acting Commissioner of Patents.