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MACHINE FOR ATTACHING IGNITION BANDS TO CIGARETTES

Filed Oct. 27, 1936

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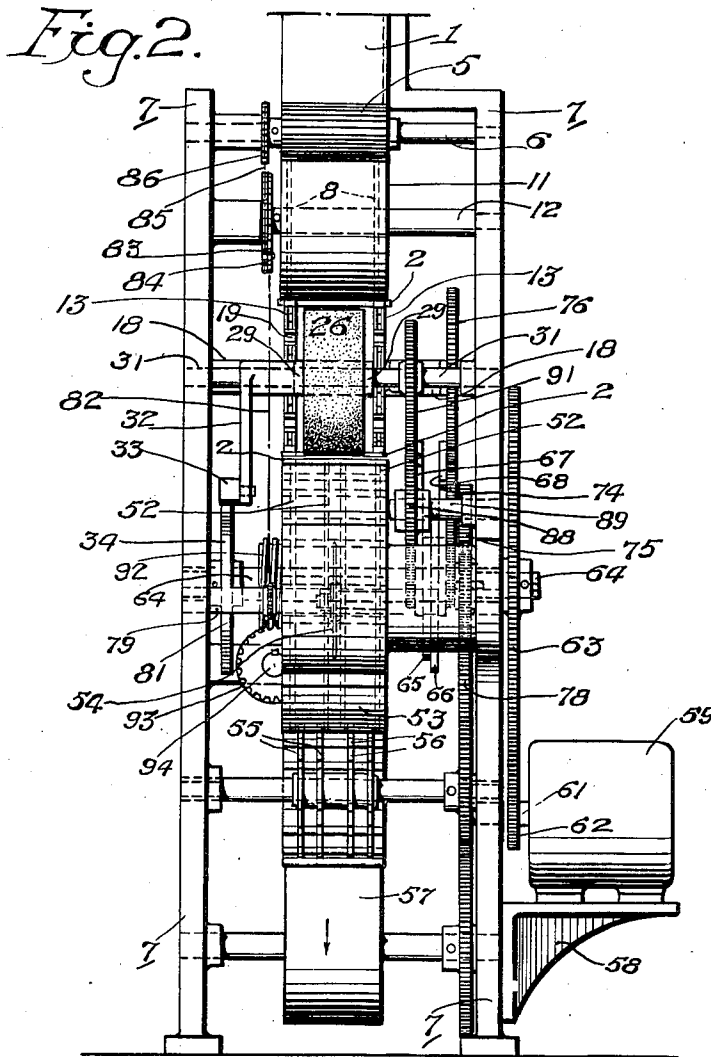
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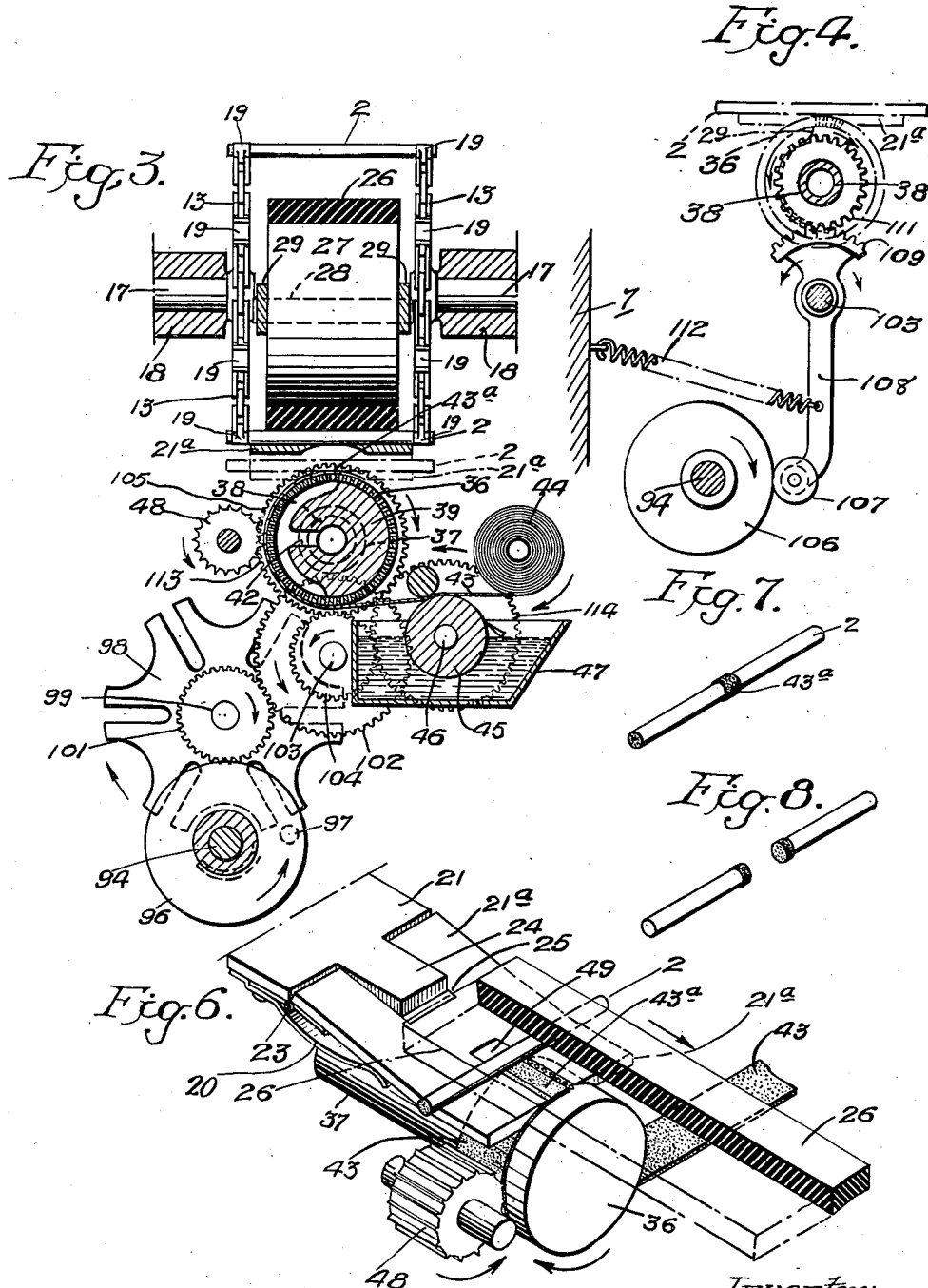
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MACHINE FOR ATTACHING IGNITION
BANDS TO CIGARETTESAnsley H. Fox, Pleasantville, N. J., assignor to
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This invention relates to machines for attaching ignition bands to cigarettes, and a principal object of the invention is to provide a novel banding machine that shall be characterized by relative simplicity of form and mechanism and high efficiency, and that shall be adapted for operation on a high production basis.

The invention further resides in the novel mechanical details and combinations hereinafter described and illustrated in the attached drawings, wherein:

Figure 1 is a longitudinal sectional elevation of the machine;

Fig. 2 is an end elevation as viewed from the right-hand end of Fig. 1;

Fig. 3 is a section on the line 3-3, Fig. 1;

Fig. 4 is a section on the line 4-4, Fig. 1;

Fig. 5 is a fragmentary view showing details of the drive mechanism;

Fig. 6 is a fragmentary view in perspective showing a detail of the mechanism;

Fig. 7 is a view in perspective of the double length cigarette blank with band attached, and

Fig. 8 is a view in perspective illustrating the manner in which the banded blank shown in Fig. 7 is separated to produce the finished article.

With reference to the drawings, the machine illustrated therein as an embodiment of my invention comprises a hopper 1 adapted to hold a suitably large number of cigarette blanks each consisting in effect of a cigarette of twice the conventional length. These blanks are shown in Fig. 1 and are identified by the reference numeral 2. Preferably the width of the hopper 1 is only slightly greater than the length of the individual blank, and the bottom wall 3 of the hopper inclines downwardly from opposite sides toward a central sump one wall of which is formed by a depending portion 4 of the hopper.

The opposite wall of the sump is formed in effect by the periphery of a roller 5, this roller being carried by a shaft 6 suitably journaled in the frame 7 of the machine and having axially extending peripheral grooves as illustrated. The blanks 2 are prevented from falling freely from the sump by disk wheels 8, 8, the peripheries of which are recessed to form in effect sockets 9 of a size to neatly receive the individual blanks 2, the said recesses of the respective wheels being aligned in the axial direction. As the wheels 8 are rotated, as hereinafter described, the individual blanks, entering the recesses 9 by gravity, are withdrawn successively from the hopper. It will be noted that the peripheries of the wheels 8 and roller 5 are contiguous and that

the roller 5 which is rotated, by means hereinafter described, in the direction indicated by the arrow in Fig. 1 and in a direction reverse to the indicated rotation of the wheels 8 functions to push the cigarette blanks away from the juncture of the roll and wheels, and thereby prevents the blanks from being pinched at the juncture. A curved baffle plate 11 extending from a point adjoining the periphery of the roll 5 to a point adjacent the bottoms of the wheels 8 closely embraces the peripheral surfaces of the latter and prevents the blanks entrained in the recesses 9 from falling by gravity from the latter until they have reached a point approximately at the bottom of the wheels. The wheels 8 are carried by a shaft 12 which is suitably journaled in the frame 7 of the machine, as illustrated in Fig. 2.

Immediately below the wheels 8 is an endless conveyer consisting, as shown in Figs. 1, 2 and 3, of spaced chains 13, 13, which chains engage and are supported by sprockets 14 and 16. The sprockets 14 which support the chains at one end are carried by a shaft 15 journaled in the frame; while the sprockets 16 which support the opposite ends of the chains are individually supported, as shown in Fig. 3, on axially aligned stub shafts 17, 17, which are journaled in bosses 18 extending inwardly from opposite sides of the frame. This mode of supporting the sprockets 16 is adapted to leave the space between the sprockets free and unobstructed for a purpose hereinafter set forth. Certain of the links of the chains 13, designated by the reference numeral 19, are in the form of sockets of a size to receive and neatly embrace the cigarette blanks 2, and these socket-links 19 of the respective chains are uniformly spaced throughout the lengths of the chains and are transversely aligned so as to be capable of supporting the opposite ends of each individual blank 2, as best shown in Fig. 3. The upper run of the conveyer constituted by the chains 13, 13 passes closely below the wheels 8, and the wheels and chains are so synchronized that as each of the blanks 2 leaves its recess in the wheels, which normally occurs when the blank clears the lower end of the baffle 11, one set of the sockets 19 of the chains 13, 13 is in position to receive the blank. In normal actuation of the mechanism, each of the sockets 19, 19 as it passes directly under the wheels 8 receives a cigarette blank 2, so that the wheels 8 function in effect to feed the blanks from the hopper to the sockets of the chains 13, 13.

As the upper runs of the chains 13, 13 advancing in the direction indicated by the arrow in Fig. 1 pass downwardly around the sprockets 14, 14, the blanks are prevented from falling 5 from the sockets 19 by means of a baffle plate 21 which closely embraces the sprockets 14 and the conveyer. This baffle 21 extends from a point adjacent the bottom of the wheels 8 to a point below the sprockets 16. The upper end, i. e., that 10 end which adjoins the wheels 8, is formed with an upwardly projecting lip 22 which projects into the space between the wheels and constitutes a positive ejector insuring release of the blanks 2 from the sockets 9 and the deposition of these 15 blanks in the sockets of the conveyer chains 13. The lower extremity of the baffle 21, i. e., that end which underlies the sprockets 16, is in the nature of an extension which is hinged at 23 to the fixed portion of the baffle 21 and is adapted 20 as hereinafter described to be forced downwardly from the normal position, in which it is shown in solid lines in Fig. 1, to a relatively depressed position as shown in broken lines in this same figure and as more clearly shown in Fig. 6. In 25 this latter figure, the hinged extremity of the baffle 21 is indicated by the reference character 21a. With reference to this latter figure, it will be noted that the fixed portion of the baffle 21 is provided with a centrally projecting tongue 30 24 which projects beyond the pivot 23 and into a correspondingly formed recess 25 in the hinged extension 21a. A spring 20 on the under side of the baffle 21, see Figs. 1 and 6, functions normally to maintain the hinged extension 21a in the 35 normal elevated position.

Projecting into the space between the sprockets 16, 16 and to a position overlying the hinged extension 21a of the baffle 21 is one end of an endless belt 26. This belt is supported at one end, 40 i. e., that end which projects between the sprockets 16, 16 upon a roller 27, which roller is journaled upon a shaft 28 supported and extending between a pair of arms 29, 29. These arms 29 extend in substantial alignment with the conveyer chains 13, 13 and are secured at their opposite ends for oscillation to a rock shaft 31 suitably journaled in the frame of the machine. Also 45 secured to the shaft 31 is a lever 32 which extends forwardly and carries a roller 33 for engagement with the periphery of a cam 34. This cam thereby serves to support the arms 29 and to afford said arms a predetermined oscillatory movement about the shaft 31. Journaled on the shaft 31 between the arms 29 is a roller 35 which 50 supports the end of the belt 26. The belt 26 preferably is made of resilient rubber and functions for a purpose hereinafter described.

Immediately below the outer end of the hinged extension 21a of the baffle 21, and as best shown 60 in Figs. 3 and 6, is mounted a perforated roll 36. This roll constitutes in effect the enlarged terminal end of a hollow shaft 37 which is suitably journaled in the framework of the machine. An inner hollow shaft 38 extends through the 65 shaft 37 and has at its inner end a valve element 39, see Fig. 3, which occupies a position within the perforated roll 36. The outer end of the shaft 38, as shown in Fig. 1, is connected by a flexible tube 41 to a suitable source of suction 70 (not shown), and this suction imposed upon the hollow shaft 38 is also imposed through the radial valve passage 42 upon approximately 180° of the periphery of the perforated roll 36, the valve 39 functioning to exclude the suction from the remaining 180° of the perforated roll surface. A 75

strip 43 of ignition composition is passed to the perforated roll 36 from a roll 44 of said strip material suitably supported in the machine, and is held tightly against the perforated roll 36 by suction imposed on the interior of the latter as 5 previously described. In passing to the roll 36, the strip 43 contacts an adhesive applicator wheel 45 which is carried by a shaft 46 extending transversely of an adhesive pot 47, said wheel engaging the under side of the strip 43 and functioning to apply a suitable adhesive in which 10 the said wheel is immersed to the surface of the strip as it passes to the perforated roll 36. As the strip 43 passes upwardly on the face of the wheel 36, it is divided transversely into a series of narrow strips by means of a rotary cutter 15 48 which rotates in contact with the surface of the perforated roll. The severed portions of the strip 43 are held to the roll 36 by suction as previously described. 20

It will be noted by reference to Fig. 6 that the hinged extension 21a of the baffle 21 is longitudinally recessed from its free end and centrally, as indicated at 49. It will be noted further that the extremity of the hinged extension 25 21a is slightly offset and that the under side of the extension at each side of the recess 49 is beveled and shaped to conform to the curved surface of the perforated roll 36, so that when the hinged extension 21a is forced downwardly, 30 a cigarette supported on the top of said extension will be brought into a position for engagement with that one of the severed sections of the ignition band 43 which at the moment occupies a position at the top of the perforated 35 roll 36 and which is exposed in the recess 49 of the extension 21a. Assuming now that a cigarette blank 2 supported in a position on the extension 21a as shown in Fig. 6 is rolled outwardly over the extension towards its outer end, it will be apparent that the severed section of the 40 ignition band with which it contacts and which as previously described has received a coating of a suitable adhesive will be picked up and wound around the blank 2 at its mid section. In order 45 to facilitate this pickup and to prevent the suction imposed on the interior of the perforated roll 36 from interfering therewith, means is provided for oscillating the valve 39 to cut off the suction from the perforations of the roll 36 immediately below the severed section of the 50 ignition band 43 which is about to be picked up by the blank 2. The mechanism by which this oscillation of the valve 39 is achieved will be described hereinafter. 55

Depression of the hinged extension 21a to bring the cigarette blanks into pickup relation with the ignition band sections as described above is effected by means of the belt 26. As shown in Fig. 1, the pulley or roll 27, and the arms 29 which 60 carry this roll are moved into the elevated position when the roller 33 of the lever 32 rides on the high part 34a of the cam 34. As the cam revolves, the roller 33 is permitted to drop to the lower portion of the cam, with the result that 65 the lower run of the belt 26 presses downwardly upon the cigarette blank 2 which then rests as shown in Fig. 1 upon the outer end of the hinged extension 21a of the baffle 21, the weight of the arms 29, pulley 27 and of the belt forcing the 70 part 21a downwardly into the depressed position as shown in Fig. 6. The cigarette blank then occupies the position shown in the last-named figure at one end of the severed portion 43a of the strip 43 which is exposed at the top 75

of the perforated cylinder 36 in the recess 49 of the extension 21a. The travel of the belt 26 now rolls the cigarette blank over the outer end of the extension 21a and in engagement with the adhesive-coated surface of the severed portion 43a of the strip 43. Simultaneously the valve element 39 is moved to cut off the suction from the apertures underlying the strip 43a, with the result that the latter adhering to the rolling cigarette blank is wrapped in the form of a band around the mid section of the blank. As the blank leaves the extension 21a, it passes onto a platform 51, the end of which closely adjoins the outer end of the part 21a, this platform being substantially horizontal. When the belt 26 is again elevated, the banded blank being released from engagement with the belt 26 remains stationary upon the platform 51 until the belt again moves downwardly as described above, when the latter again engages the banded blank and advances it to a predetermined further extent along the platform 51.

The opposite end of the platform 51 lies in proximity to the periphery of a plurality of disk wheels 52, these wheels being four in number in the present instance, as shown in Fig. 2. The peripheral edges of these wheels are provided with annular series of recesses or sockets for reception of the banded blanks as the latter pass from the platform 51, and the rotary movement of the wheels 52 is synchronized with the movement of the belt 26 so that the blanks are accurately passed into the said sockets. In these latter sockets, the banded blanks are retained by means of a guard plate 53 which embraces a portion of the circumference of the wheels as shown in Figs. 1 and 2. This guard plate extends to a point adjacent the bottoms of the wheels 52. At an intermediate point in the guard plate 53, the latter is slotted for admission midway between the two inner wheels 52 of a rotary cutter blade 54, the banded blanks being carried on the wheels 52 downwardly into contact with this cutter disk and being severed by the latter into two sections of equal length. The division of the banded blanks occurring at the mid section bisects the ignition band attached as previously described, thereby producing two cigarettes of conventional length each provided at one end with an ignition band. These banded cigarettes are transferred from the wheels 52 at the bottom of the latter to two sets of peripherally socketed wheels 55, 55 and 56, 56 which rotate as indicated by the arrow in Fig. 1 and which in turn transfer the cigarettes to an endless belt conveyer 57 which carries them from the machine.

From the foregoing description the general mode of operation will be understood. The mechanism by which the synchronized actuation of the various elements of the machine outlined above is obtained is as follows: By reference to Fig. 2, it will be noted that the frame carries at one side and near the bottom a bracket 58 which supports a motor 59. The shaft 61 of this motor carries a pinion 62 which meshes with a large gear 63 secured to one end of a shaft 64 journaled in the frame 7 of the machine. Fixed to this shaft are two disks 65 and 66 which constitute elements of two separate Geneva movements, the other elements of which are constituted respectively by escapement wheels 67 and 68. These latter wheels are respectively journaled on shafts 69 and 71 projecting inwardly from one side of the frame. Each of the disks 65 and 66 carries a pin, 72 and 73 respectively,

which engage the slots of the escapement wheels 67 and 68 in well known manner to produce an intermittent rotation of these wheels. The wheel 68 has secured thereto a gear 74 which meshes with a gear 75, and the gear 75 in turn meshes with a gear 76 carried by the shaft 15. Through this gear train and the escapement 66—68, the chain conveyer 13, 13 is given an intermittent movement.

The motor 59 also effects an intermittent rotation through the disk 65 and pin 72 of the escapement wheel 67, and to this wheel is connected a pinion 77 coactive with a gear 78 on the shaft 79 which carries the transfer wheels 52, so that these transfer wheels also are given an intermittent movement. The shaft 79 carries a sprocket 81 which is connected through a chain 82 with a sprocket 83 on the shaft 12 which carries the transfer wheels 11. The resulting intermittent rotary movement of the transfer wheels 8 is synchronized as previously described with the intermittent movement of the chain conveyer 13, 13. The shaft 12 carries a second sprocket 84 which is connected through a chain 85 with a sprocket 86 on the shaft 6 which carries the roller 5.

A second gear wheel 87 operatively connected with the escapement wheel 67 meshes with a gear 88 journaled on a stub shaft 89 secured in the frame, and this gear 88 in turn meshes with a gear 91 on the shaft 31 which carries the pulley 35 of the belt 26 whereby through the escapement 65—67 the belt 26 is given an intermittent movement synchronized with the movement of the chain conveyer 13, 13 and also with the intermittent rotary movement of the transfer wheels 52.

Carried by the shaft 64 is a worm 92 which meshes with a worm wheel 93 carried by a shaft 94 suitably journaled at 95, 95 in the machine and extending longitudinally of the latter. The shaft 94 carries a disk 96 having a projecting pin 97 adapted to engage an escapement wheel 98 which is carried by a shaft 99. Continuous rotation of the worm 92 accordingly results in an intermittent rotation of the shaft 99. This shaft carries a pinion 101 which meshes with a gear 102 on a shaft 103, and this latter shaft carries also a gear 104 which meshes with a gear 105 secured to the hollow shaft 37. This shaft as previously described carries the perforated roller 36, and through the transmission mechanism described this roller is given an intermittent rotation suitably synchronized with the intermittent movements of the chain conveyer 13, 13 and the belt 26.

Carried by the shaft 94 is a cam 106. This cam is engaged by a roller 107 at the lower end of a lever 108 which is journaled as shown in Figs. 1 and 4 on the shaft 103. The lever 108 carries at its upper end a segmental gear 109 which meshes with a pinion 111 secured to the shaft 38, which as previously described carries the valve element 39. Rotation of the shaft 94 with the cam 106, lever 108, segmental gear 109 and pinion 111 effects an oscillation within narrow limits of the shaft 38. This oscillation of the shaft 38, and consequently of the valve element 39, is synchronized with the intermittent movement of the perforated disk 36, and as previously described is of a character to carry the valve 39 at predetermined intervals into a position such that suction is cut off from those apertures of the perforated roll 36 which immediately underlie the severed section of the strip 43 which lies at the top of the roller 36 and which

is about to be picked up by a cigarette blank. It will be noted that a spring 112 attached to the lower portion of the lever 108 functions to resiliently hold the roller 107 against the surface of the cam 106.

Carried by the shaft 37 is a gear 113 which meshes with a gear 114 on the shaft 46 which carries the adhesive applicator roll 45, and this roll is thereby rotated intermittently in synchronism with the intermittent rotation of the perforated roll 36.

From the foregoing description, the construction and operation of the machine will be readily understood. The double-length cigarette blanks 2 are fed successively to the chain conveyer 13, 13, are conducted by the latter to a point overlying the hinged extension 21a of the plate 21, are carried downwardly on the hinged extension and rolled over the adhesive-coated ignition band by the belt 26, are then fed by the latter to the transfer wheels 52, are divided while on these wheels by the knife 54, and are subsequently transferred by the wheels 55 and 56 to the conveyor belt 57. The perforated roll 36 is operated intermittently to feed the ignition bands into position for contact with the cigarette blanks, and the valve 39 functions synchronously with the other related parts of the mechanism to cut off the suction from the individual ignition-band blanks as the latter are wound onto the cigarette blanks.

I claim:

1. In a cigarette banding machine, the combination with a table, of means for depositing cigarette blanks successively on said table, means for rolling said blanks over the table, means for inserting an adhesive-coated strip of banding material in the path of said blanks as they roll over the table whereby said strip is caused to adhere to the rolling blank and is wound upon the latter, and means for dividing said blank upon a transverse line passing through the middle of said band to thereby produce two cigarettes each having a narrow adhering band at one end thereof.

2. In a machine for attaching ignition bands to cigarettes, the combination with a table, of means for rolling cigarette blanks over said table, said table having an opening therein, and means for positioning adhesive-coated strips of the ignition band material in said opening approximately at the table level whereby as the blanks are rolled over said table the bands are picked up adhesively and wound upon said blanks.

3. In a machine for attaching ignition bands to cigarettes, the combination with a table and means for rolling a plurality of cigarettes over said table, said table having an aperture, and mechanism for introducing adhesive-coated strips of the banding material in said aperture for contact with the individual cigarettes as the latter are rolled from the table whereby said bands are picked up adhesively by the blanks and wound upon the latter.

4. In a cigarette banding machine, the combination with a table and means for rolling a plurality of cigarette blanks successively over said table, of means operating in synchronism with said rolling means for inserting an adhesive-coated strip of banding material in the path of each cigarette as it rolls over the table whereby the band is picked up and wound upon said blank, said rolling means comprising an endless belt positioned above said table and having a resilient face for contact with said cigarettes.

5. In a cigarette banding machine, the combination with a table comprising a section movable downwardly from the normal plane of said table and means for normally retaining said section in its elevated position, said movable section having an opening therein, of means operative in the depressed position of said movable section for positioning adhesive-coated strips of the banding material in said opening and approximately in the plane of the upper surface of said section, means for feeding a plurality of cigarettes over said table and successively onto said movable section, means for advancing said cigarettes by rolling movement over said movable section of the table, and means for depressing said movable section to bring each of said cigarettes into rolling contact with a strip of said banding material positioned in said opening whereby as the cigarettes are rolled over said section the bands are picked up adhesively and wound upon the cigarettes.

6. In a cigarette banding machine, the combination with a table comprising a section movable downwardly from the normal plane of said table and means for normally retaining said section in its elevated position, said movable section having an opening therein, of means operative in the depressed position of said movable section for positioning adhesive-coated strips of the banding material in said opening and approximately in the plane of the upper surface of said section, means for feeding a plurality of cigarettes over said table and successively onto said movable section, means for advancing said cigarettes by rolling movement over said movable section of the table, means for depressing said movable section to bring each of said cigarettes into rolling contact with a strip of said banding material positioned in said opening whereby as the cigarettes are rolled over said section the bands are picked up adhesively and wound upon the cigarettes, said rolling means comprising an endless belt conveyer having one end thereof positioned above said movable table section for engagement with the cigarettes, and means for intermittently depressing the said end of the conveyer to force said movable table section downwardly into the depressed position.

7. In a cigarette banding machine, the combination with a table comprising a section movable downwardly from the normal plane of said table and means for normally retaining said section in its elevated position, said movable section having an opening therein, of means operative in the depressed position of said movable section for positioning adhesive-coated strips of the banding material in said opening and approximately in the plane of the upper surface of said section, said positioning means comprising a perforated drum positioned below said movable section of the table and said opening and provided with suction means operative through said perforations to retain a strip of the banding material in contact with the drum surface, a cutter element co-operative with said drum for dividing said strip transversely into a plurality of narrow sections, said drum when the movable table section is depressed presenting one of said severed band sections through said opening approximately at the level of the upper surface of said table section, means for coating the outer exposed face of said banding strip with an adhesive, means for feeding cigarettes successively to said movable table section, and means for intermittently depressing the said

table section and for advancing the cigarettes thereover by rolling action and in contact with said adhesive-coated sections of the banding material whereby the said banding elements are picked up adhesively and wound upon said cigarettes.

8. In a cigarette banding machine, the combination with means for supporting an adhesive-coated band in predetermined position in said machine, of mechanism for translating a cigarette blank from a remote position and by movement transverse to the adhesive-coated surface of the band into contact with said surface to thereby insure adherence of the band to the blank, and means above the cigarette blank for subsequently advancing the blank by rolling motion over the band to thereby wind the band about the blank.

9. In a cigarette banding machine, the combination with means for supporting an adhesive-coated band in predetermined position in said machine, of means for supporting a cigarette blank in a position removed transversely from the adhesive-coated surface of said band, mechanism for translating said blank in the transverse direction into contact with said coated surface, and means above the cigarette blank for subsequently advancing the blank

by rolling motion over the band to thereby wind the band about the blank.

10. In a cigarette banding machine, the combination with means for supporting an adhesive-coated band in predetermined position in said machine, of means for supporting a cigarette blank in a position removed from and above said band, and mechanism for moving said blank downwardly into contact with the adhesive-coated surface of the band, said mechanism including means for subsequently advancing the blank by rolling motion over the band to thereby wind the band about the blank.

11. In a cigarette banding machine, the combination with mechanism for successively feeding adhesive-coated bands into a predetermined position in the machine, mechanism for successively feeding cigarette blanks into position removed from and overlying said bands, and other mechanism for moving said blanks individually and successively downwardly into contact with the coated surfaces of the respective bands, said latter mechanism including means for subsequently advancing the blanks by rolling motion over the bands to thereby wind the bands about the blanks."

ANSLEY H. FOX.