Aug. 25, 1953 W. F. M. EDWARDS 2,649,761

MANUFACTURE OF FILTER TIP AND LIKE COMPOSITE CIGARETTES

Filed June 19, 1951 6 Sheets-Sheet 1

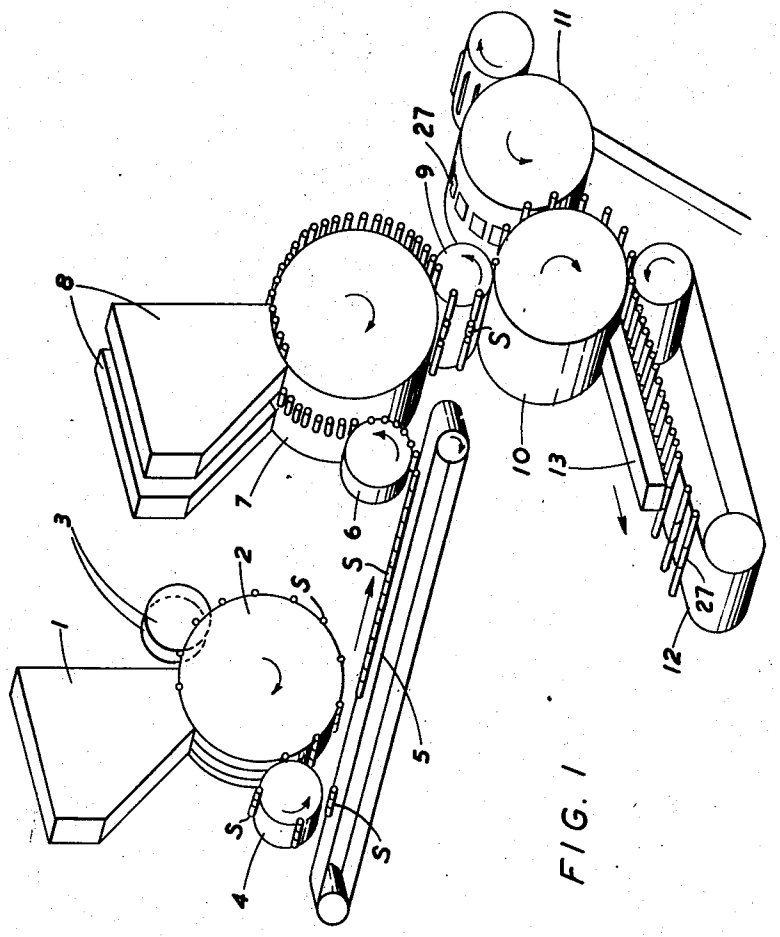

FIG. 1

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MANUFACTURE OF FILTER TIP AND LIKE COMPOSITE CIGARETTES

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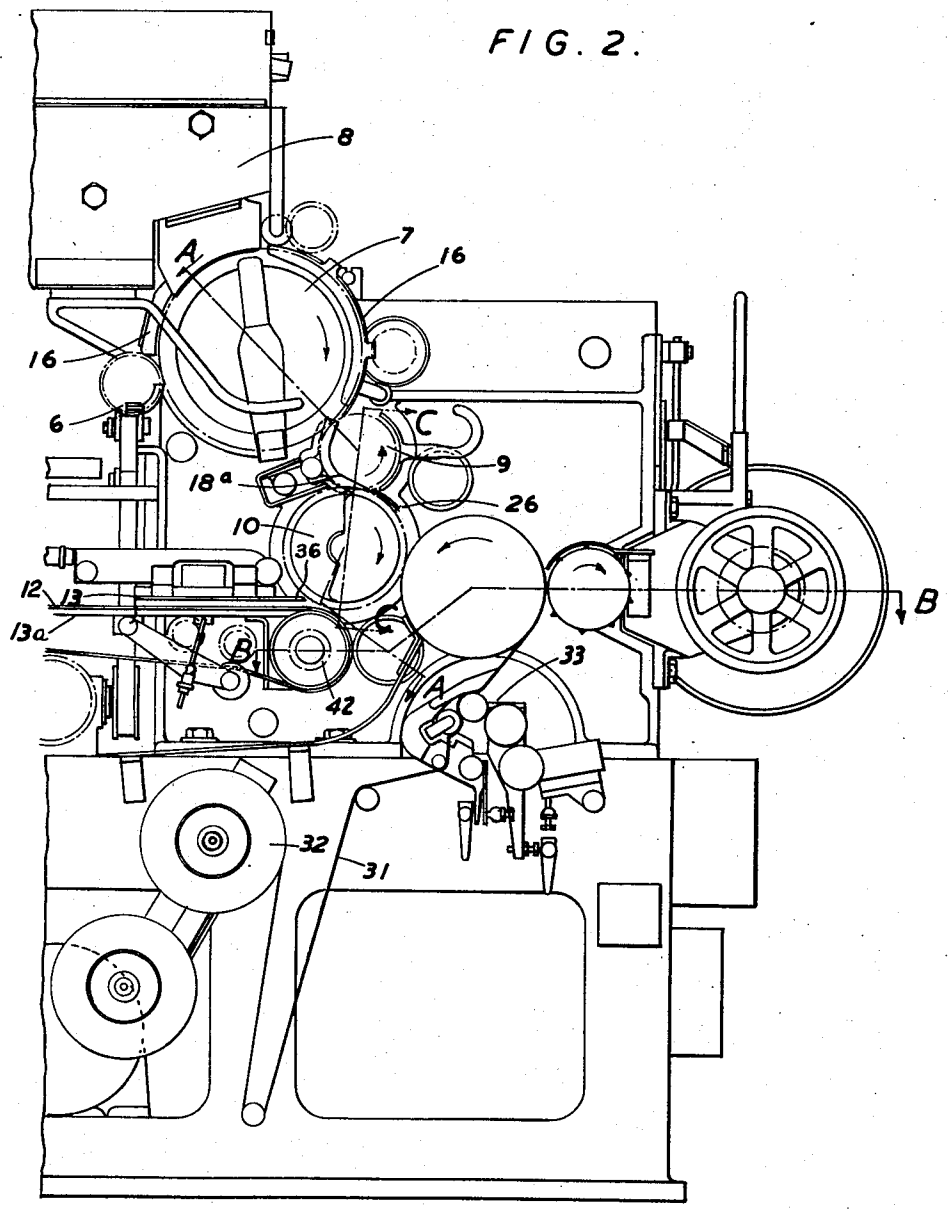
FIG. 2.



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MANUFACTURE OF FILTER TIP AND LIKE COMPOSITE CIGARETTES

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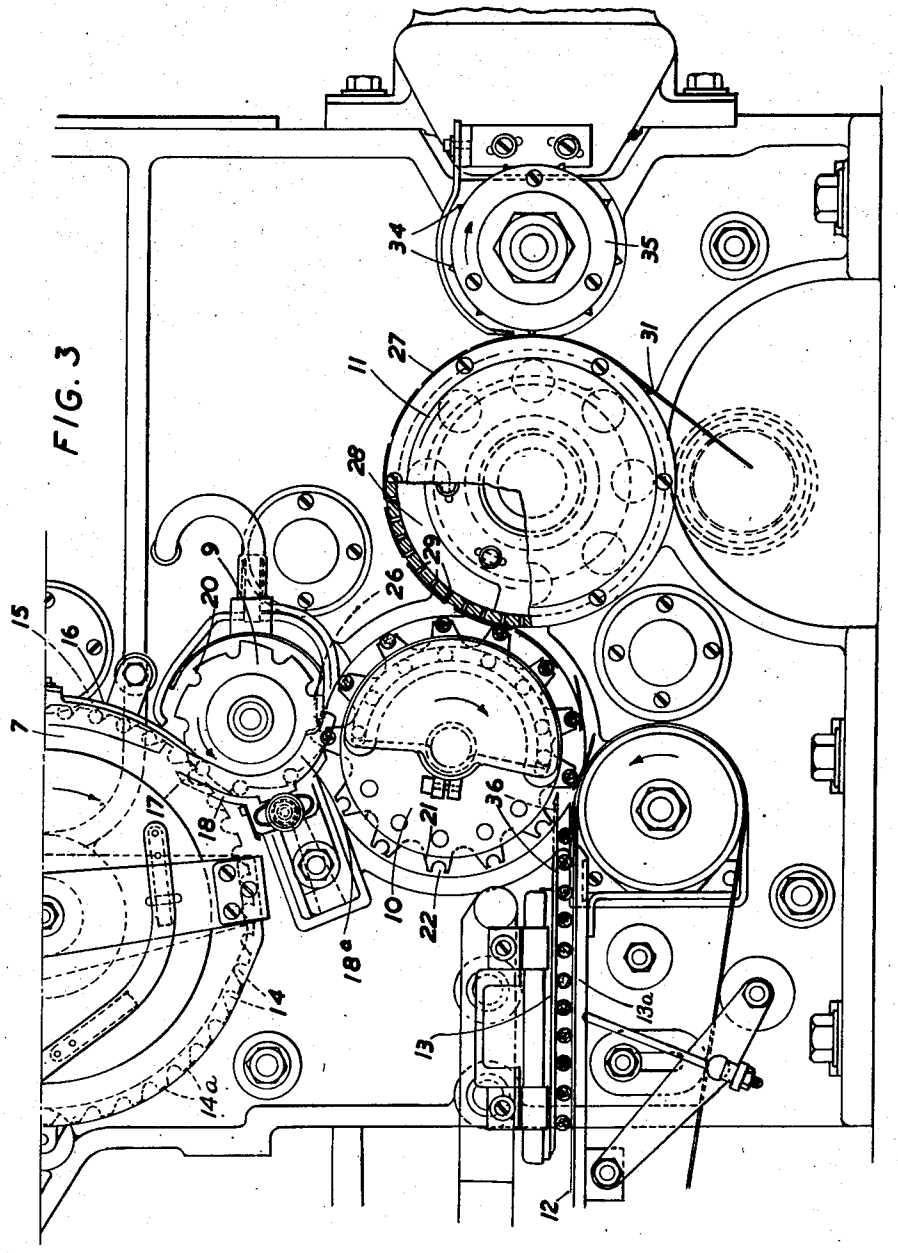
FIG. 3



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MANUFACTURE OF FILTER TIP AND LIKE COMPOSITE CIGARETTES
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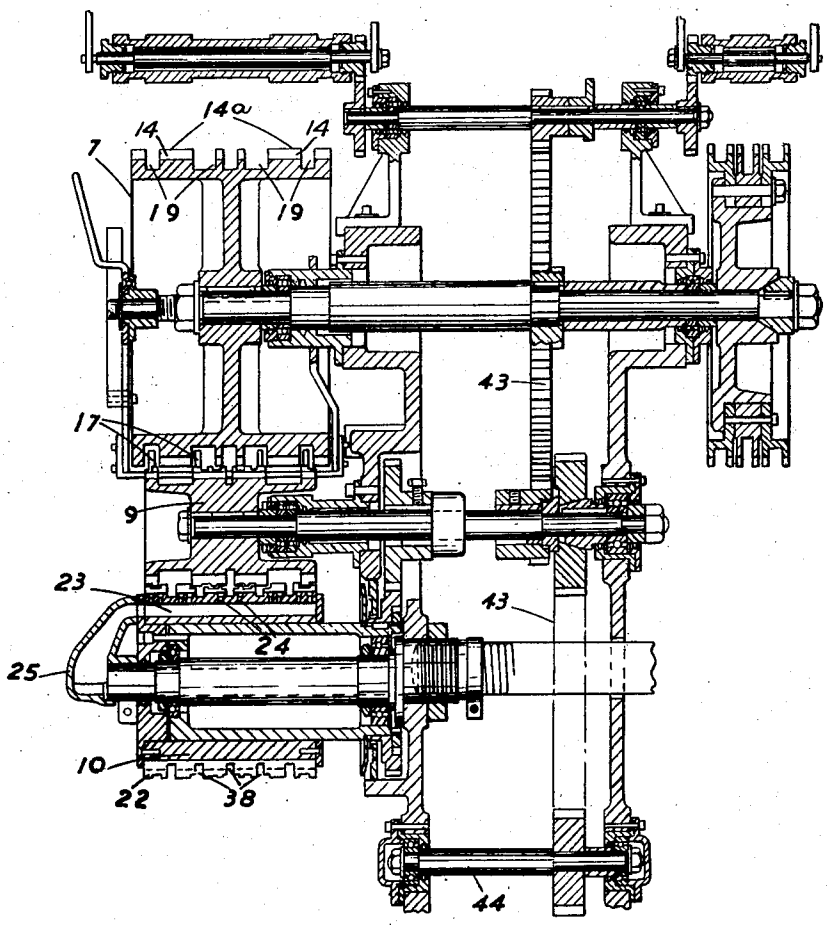
FIG.4



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MANUFACTURE OF FILTER TIP AND LIKE COMPOSITE CIGARETTES

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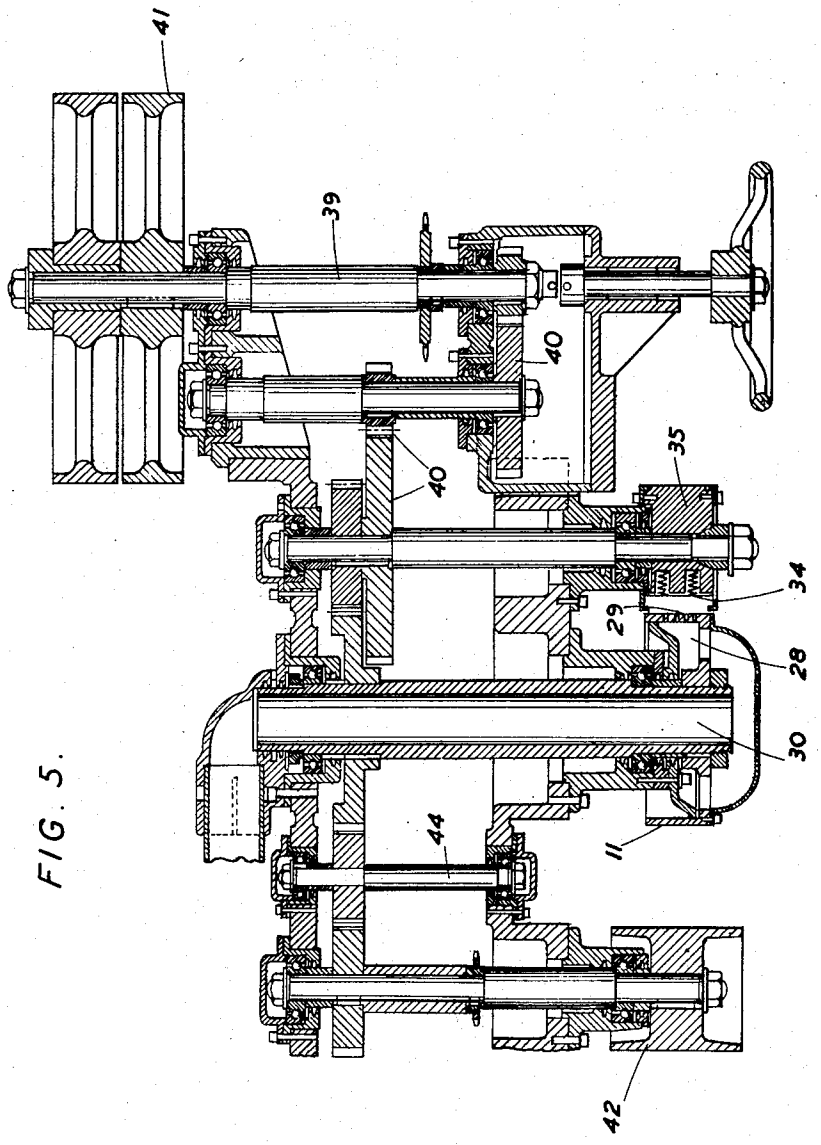

FIG. 5.

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MANUFACTURE OF FILTER TIP AND LIKE COMPOSITE CIGARETTES

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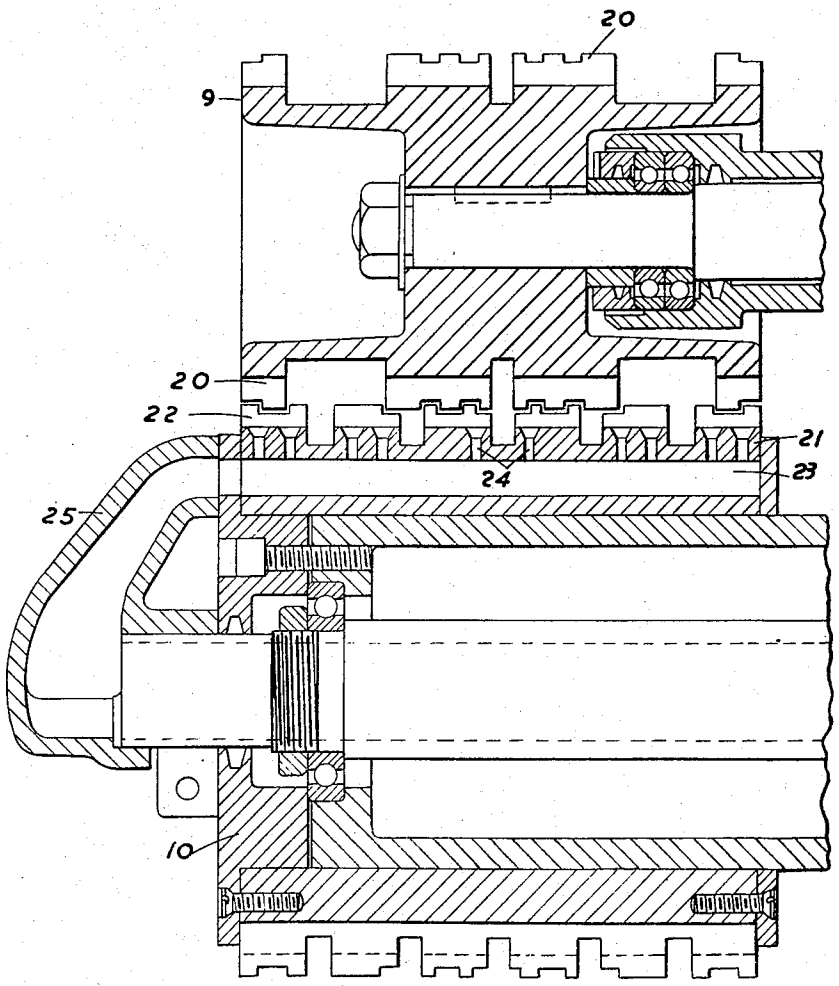
FIG. 6



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Patented Aug. 25, 1953 2,649,761

UNITED STATES PATENT OFFICE

2,649,761

MANUFACTURE OF FILTER TIP AND LIKE COMPOSITE CIGARETTES

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Application June 19, 1951, Serial No. 232,273
In Great Britain June 19, 1950

7 Claims. (Cl. 131—94)

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This invention relates to the manufacture of filter tip and like composite cigarettes by uniting assemblages formed by lengths of cigarette rod and stub portions by means of uniting bands of cork or the like.

The expression "stubs" used herein comprises filter tips, wads or plugs of any desired material or combination of materials, such stubs being generally enclosed in paper retaining wrappers although, in the case of wads or spiral or other suitable formation, other means may be employed for retaining the formation so that the paper wrapper may be dispensed with, and also includes tubes which may be empty or filled or partially filled with filtering material and/or tobacco. The expression "lengths of cigarette rod" comprises cigarettes of the usual length, or lengths of cigarette rod shorter or longer than the usual cigarette.

It is known to manufacture filter tip and like composite cigarettes by uniting assemblages formed by aligned component lengths of cigarette rod and stub portions by means of uniting bands of cork or the like, the uniting bands being wrapped around the assemblages by rolling the latter between relatively movable surfaces.

Single lengths of cigarette rod and stub portions may be united in this way to form single cigarettes, but conveniently two single lengths of cigarette rod are united to double length stub portions interposed between them, the product being subsequently bisected.

In the known machines, the lengths of cigarette rod and stub portions are assembled on an assembly conveyor which conveys the assemblages laterally of their axes, successive assemblages being positively spaced by location in successive transverse depressions in the conveyor, for example in transverse grooves in the periphery of a conveyor drum.

From the assembly conveyor the assemblages are either fed directly to a rolling drum or are transferred thereto by means of a transfer conveyor which also conveys the assemblages laterally of their axes, successive assemblages again being positively spaced by location in successive transverse depressions in the conveyor, which latter may be a wheel having projections with fluted ends adapted to receive and hold the assemblages by suction during transfer. The pitch of the assembly conveyor, and of the transfer conveyor when the latter is used, i. e. the distance between the centre lines of successive assemblages located in adjacent transverse depressions of the conveyor or conveyors, is equal to the spacing of the assemblages fed to the rolling drum, and the assemblages travel throughout at constant speed and constant spacing.

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It is an object of this invention to provide a way of forming the component lengths of cigarette rods and stub portions into assemblages when the latter are travelling at a closer spacing, and a lower speed, than when the assemblages are traveling at the greater spacing and higher speed at which they are subsequently fed to the rolling means. When, as is preferred, the assemblages are formed in transverse grooves in the periphery of an assembly drum rotating about a horizontal axis, the upper peripheral surface of the drum being in contact with a transverse opening in the bottom of a hopper containing lengths of cigarette rod, single lengths of cigarette rod pass, one by one, into successive grooves in the assembly drum much more smoothly and with much less turbulence of the hopper contents, when the grooves of the drum are spaced closer and the drum revolves proportionally slower.

The present invention provides a method of feeding laterally spaced assemblages of lengths of cigarette rod and stub portions to a rolling means, which method comprises forming assemblages travelling laterally of their axes at a given linear speed and at a positively determined lateral spacing less than the circumferential length of an assemblage, and feeding the formed assemblages to the rolling means at an increased positively determined lateral spacing greater than the said circumferential length and at a correspondingly increased linear speed.

The present invention also provides apparatus for carrying out the above method, comprising an assembly conveyor having transverse assemblage-transporting depressions, a transfer conveyor, adapted to feed assemblages to the rolling means, having transverse assemblage-transporting depressions of a pitch greater than the circumferential length of an assemblage, the assembly conveyor being geared to transport assemblages at a lower linear speed than the transfer conveyor and having a pitch proportionately smaller than that of the transfer conveyor, and means for transferring successive assemblages from the assembly conveyor to the transfer conveyor with appropriate acceleration of the assemblages during transfer.

The invention also provides apparatus for feeding laterally spaced assemblages of lengths of cigarette rod and stub portions to a rolling

means comprising a rotatable assembly wheel or drum having a number of spaced peripheral assemblage-transporting grooves disposed parallel with the axis of the wheel or drum; a rotatable transfer wheel or drum having assemblage-transporting flutes which are spaced from each other by a distance greater than the circumferential length of an assemblage and are disposed parallel with the axis of the wheel or drum, the said wheel or drum being geared to transport the assemblages at a higher linear speed than the assembly wheel or drum; and a rotatable, multi-toothed accelerator wheel, or drum, the teeth of which are adapted to engage assemblages received from successive grooves of the assembly wheel or drum and to introduce them into successive flutes of the transfer wheel or drum.

The accelerator wheel or drum has a speed of engagement and acceptance of an assemblage which, by reason of the number of its teeth and speed, provides a spacing apart of the assemblages to facilitate the wrapping in phase with the rolling means.

Preferably the assemblages, after their formation on the assembly conveyor, and subsequent transfer to the transfer conveyor, are rolled and united as described in our co-pending application Serial No. 232,275, now abandoned.

In the accompanying drawings which illustrate a preferred embodiment of the invention by way of example:

Figure 1 is a diagram illustrating the operation of an apparatus for uniting spaced assemblages of length of cigarette rod and stub portions,

Figure 2 is a side elevation of part of the apparatus,

Figure 3 is a side elevation of part of the same apparatus to a larger scale,

Figure 4 is a section taken on line A—A of Figure 2,

Figure 5 is a section taken on line B—B of Figure 2 and

Figure 6 is a section taken on line C—C of Figure 2.

Referring first to Figure 1, stub portions of six times the desired final length are fed from a stub hopper 1 into the transverse grooves (not shown) of a horizontal rotating drum 2. As the drum 2 rotates, rotating knives 3 sever the lengths of stub portions into three lesser lengths, each double the desired final length of stub portion. It will be understood that the stub portions can if desired be cut up into a different number of lesser length or they need not be cut at all if they are already the desired size. The severed double stub portions are then transferred by a transfer wheel 4 to the upper horizontal run of an endless moving conveyor band 5, which transports them transversely of the apparatus and they are then picked up singly by a second stub transfer wheel 6 and transferred to an assembly drum 7. The assembly drum 7 rotates, about a horizontal axis disposed transversely of the apparatus beneath two hoppers 8 which are spaced laterally of the drum and each contains lengths of cigarette rod. From transverse openings in the bottom of each hopper, single lengths of cigarette rod pass one by one into successive grooves of the drum 7, thereby to form in each groove an assemblage consisting of a double length of stub having a single length of cigarette rod on each side thereof.

The assemblages are conveyed downwards on the downgoing side of the drum 7 and delivered

to a multi-toothed accelerator wheel 9 which accelerates the assemblages in their movement and delivers them to a transfer conveyor wheel 10. A length of uniting band 27 is attached to each assemblage while it is on the transfer wheel 10 by means of a band feeding drum 11 and the assemblage, together with its attached length of uniting band, is then delivered on to the upper run of an endless band 12 consituting a rolling conveyor, the assemblage being rolled between a counter-surface, such as a stationary plate 13, and the endless band 12 so wraps the uniting band around it.

As shown in Figure 3, the assembly drum 7 is provided with transverse peripheral grooves 14 the centres of which are spaced by a distance considerably less than the circumferential length of the assemblages 15 to be formed. These grooves are separated from one another by relatively narrow intervening tooth-like portions 14a, and the leading faces of the grooves are offset from the centre line of the drum to point forwards in the circumferential direction of movement of the drum.

The double length stub portions are transferred from wheel 6 (Fig. 2) one by one to the center part of successive grooves 14 of the assembly drum 7 on the upgoing side of the drum, where they are retained by a shield 16 (Fig. 2) which extends around a considerable part of the periphery of the assembly drum. The upper peripheral surface of the assembly drum lies immediately beneath the two hoppers 8 (only one of which is visible in Fig. 2) containing lengths of cigarette rod, and from each hopper 8 single lengths of cigarette rod pass one by one into successive grooves 14 in the assembly drum 7 as the latter rotates, so that an assemblage is formed comprising a double length of stub having on either side thereof a single length of cigarette rod with an intervening gap between the stub portion and the cigarette length on either side of the stub portion.

From the hoppers 8 the assemblages move downwards on the downgoing side of the drum 7 as the latter rotates, being retained in the lateral grooves 14 by the aforementioned shield 16.

Towards the bottom of the circumferential path of the assemblages, fingers 17 (Fig. 4) formed on a curved guide ramp 18 extend into circumferential grooves 19 formed in the drum 7 and at this point the shield 16 also terminates, so that the assemblages 15 are dislodged one by one from the grooves 14. As each assemblage is dislodged from its respective groove in the assembly drum 7, it is engaged by a tooth 20 of the wide-pitched multi-toothed accelerator wheel 9, which accelerates the assemblage 15 in its movement, and with the assistance of the curved guide ramp 18 and stripper ramp 26 deposits the accelerated assemblage on the transfer conveyor wheel 10 as described below.

Viewed in profile, the front face of each tooth 20 of the accelerator wheel 9, which engages and accelerates an assemblage, extends substantially radially of the wheel, whilst the rear face of each tooth is formed as a salient curve which merges via a re-entrant portion with the radially extending front face of the next tooth.

Over the first part of the downgoing side of the accelerator wheel 9, the curved ramp 18 prevents the assemblages 15 from escaping from the teeth 20 and two convergent arcuate guide plates 18a engage the outer ends of lengths of cigarette

rod and move them into contact with the central stub portions.

The transfer wheel 10 (Fig. 3) is provided with peripheral projections 21 having flutes 22 which receive the assemblages 15 (Fig. 3), the flutes 22 being spaced circumferentially at a distance greater than the circumferential length of an assemblage. The relative pitch of the transfer wheel 10 is preferably slightly greater than that of the accelerator wheel 9. Each assemblage 15, in turn, is transferred from the assembly drum 7 by accelerator wheel 9 to a flute 22 of the transfer wheel 10 as the flute reaches approximately the top of its travel. The interior of the wheel 10 has a suction chamber 23 (Fig. 4) which communicates with the flutes 22 through passages 24 and is connected with a suction manifold 25. The flutes 22 are connected with suction chamber 23 only during the downgoing movement of wheel 10. Thereafter, each assemblage is held by suction from chamber 23 in its flute, and is brought into contact with a length 27 of adhesive-coated uniting band 31 travelling on the band-feeding drum 11 (see Fig. 3).

The band-feeding drum 11 is provided with a suction chamber 28 which communicates with the periphery of the drum through passages 29 and is connected with a suction manifold 30 (Fig. 5) the passages communicating with the chamber over a desired arc of motion so as to retain the uniting bands 27 on the surface of the drum. A continuous length 31 of uniting band is fed continuously from a reel 32 (Fig. 2), through a gumming device 33, for applying suitable adhesive to its outer side. The uniting band then passes on to the upgoing side of the drum 11, and is there severed by the radial blades 34, of a rotary cutter 35, into predetermined lengths. It will be seen from Fig. 3 that, as each flute 22 of the transfer conveyor 10 in turn approaches the surface of the drum 11, the assemblage carried by the flute 22 is brought into contact with the adhesive-coated face of a length of uniting band, and the timing is such that the leading edge of the uniting band is slightly in advance of the centre of the assemblage by a predetermined amount, herein referred to as the "predetermined lap."

Due to the circumferential extent of the stationary suction chamber 28, as, or slightly before, the assemblage contacts the uniting band, the suction applied to the latter through the openings 29 in the rotary drum from the stationary suction chamber 28 is cut off, whereafter the assemblage picks up the uniting band and carries it over the intervening space between the band-feeding drum and the rolling conveyor 12 which consists of an endless moving band 12, on to the upper run of which the assemblage and attached uniting band are deposited by engagement with the fingers 36 (Fig. 3) of a ramp plate 13 in circumferential grooves 38 (Fig. 4) of the transfer wheel 10 and on the cutting off of the suction from the flute of the transfer wheel. The endless moving band 12 carries the assemblage beneath the stationary plate 13 against which the assemblage is rolled to wrap the uniting band around it as shown in Fig. 3.

The stationary plate is preferably heated along a central strip which bears on the uniting band, and this central strip is separated by slots from the remainder of the plate which bears against the lengths of cigarette rod, so that heat is applied substantially to the area in contact with the adhesive-coated band only, to cause the adhesive to set.

The upper run of the endless band 12 can be supported from below by a plate 13a which is preferably relieved slightly after a point in the direction of travel of the assemblage, corresponding to a first complete revolution of the assemblage. The first revolution of the assemblage, which effects the wrapping, is thus effected under greater pressure than any subsequent revolutions which serve mainly to allow the adhesive to be set as it travels under the heated part of the stationary plate.

As shown in Figure 5, the band-feeding drum 11 and rotary cutter 35 are driven from a main drive shaft 39 by means of a train of toothed wheels 40. The drive shaft 39 can be rotated by pulley 41 driven from an electric motor or other suitable power source. The belt 12 can be passed over a pulley 42 rotated by the same train of wheels 40. The assembly drum 7, accelerator wheel 9 and transfer wheel 10 can be rotated by a second train of toothed wheels 43 (Fig. 4) driven from a shaft 44 rotated by the gearing 40.

The overall length and diameter of the assemblages 15 may be varied considerably between a predetermined maximum and minimum.

The dimensions of the fluted projections 21 of the transfer conveyor are such that assemblages of minimum length overhang the projections slightly at either side when the assemblages are closed up, and the arcuate guide plates 18a are adjustable in their positions to perform the closing up operation on assemblages of any length between the maximum and minimum.

The transverse grooves 14 of the assembly drum 7 and the flutes 22 of the transfer conveyor wheel 10 are preferably of a radius to accommodate assemblages of a maximum diameter, and the pitch of the transfer wheel being greater than the circumferential length of such an assemblage. When manufacturing filter tip cigarettes of smaller diameter, the smaller diameter assemblages are equally well received within the grooves 14 and flutes 22, but the stationary rolling ramp 13 may be adjusted nearer to the endless rolling band 12, and adjustments are made to cut lengths of uniting band proportional to the diameter of the smaller diameter assemblages.

What I claim is:

1. Method of feeding laterally spaced assemblages of lengths of cigarette rod and stub portions to a rolling means, which method comprises forming assemblages travelling laterally of their axes at a given linear speed and at a positively determined lateral spacing less than the circumferential length of an assemblage, and feeding the formed assemblages to the rolling means at an increased positively determined lateral spacing greater than the said circumferential length and at a correspondingly increased linear speed.

2. Method of forming laterally spaced assemblages of lengths of cigarette rod and stud portions and feeding them to a rolling means, which method comprises transporting stub portions laterally of their axes on a moving conveyor, feeding single lengths of cigarette rod from a hopper on to said moving conveyor in line with said stub portions to form said assemblages, transporting said assemblages on said conveyor laterally of their axes at a given linear speed and at a positively determined lateral spacing less than the circumferential length of an assem-

blage, and feeding the formed assemblages to the rolling means at an increased positively determined lateral spacing greater than the said circumferential length and at a correspondingly increased linear speed.

3. In a cigarette machine having rolling means, apparatus for feeding laterally spaced assemblages of lengths of cigarette rod and stub portions to the rolling means comprising an assembly conveyor having transverse assemblage-transporting depressions; a transfer conveyor, adapted to feed assemblages to the rolling means, having transverse assemblage-transporting depressions of a pitch greater than the circumferential length of an assemblage, the assembly conveyor being geared to transport assemblages at a lower linear speed than the transfer conveyor and having a pitch proportionately smaller than that of the transfer conveyor; and accelerator means for transferring successive assemblages from the assembly conveyor to the transfer conveyor with appropriate acceleration of the assemblages during transfer.

4. In a cigarette machine having rolling means, apparatus for feeding laterally spaced assemblages of lengths of cigarette rod and stub portions to the rolling means comprising a rotatable assembly drum having a number of spaced peripheral assemblage-transporting grooves disposed parallel with the axis of the drum; a rotatable transfer wheel having assemblage-transporting flutes which are spaced from each other by a distance greater than the circumferential length of an assemblage and are disposed parallel with the axis of the wheel, the said wheel being geared to transport the assemblages at a higher linear speed than the assembly drum; and a rotatable, multi-toothed accelerator wheel, the teeth of which are adapted to engage assemblages received from successive grooves of the assembly drum and to introduce them into successive flutes of the transfer wheel.

5. In a cigarette machine having rolling means, apparatus for feeding laterally spaced assemblages of lengths of cigarette rod and stub portions to the rolling means, which apparatus comprises a hopper for lengths of cigarette rod, said hopper having an outlet opening through which single lengths of cigarette rod can pass; a rotatable assembly drum having a number of spaced peripheral assemblage-transporting grooves disposed parallel with the axis of the drum, said drum being arranged beneath said outlet opening so that said lengths can pass singly into successive grooves as said drum rotates; means for feeding stubs into said grooves before they pass said opening; a rotatable transfer wheel having assemblage-transporting flutes which are spaced from each other by a distance greater than the circumferential length of an assemblage and are disposed parallel to the axis of the wheel, the said wheel being geared to transport said assemblages at a higher linear speed than said assembly drum; and a rotatable accelerator wheel having teeth which are adapted to engage assemblages received from successive grooves of said assembly drum and to introduce them into successive flutes of said transfer wheel.

6. In a cigarette machine having rolling means, apparatus for feeding laterally spaced assemblages of lengths of cigarette rod and stub portions to the rolling means, which apparatus comprises a hopper for lengths of cigarette rod, said hopper having an outlet opening through which single lengths of cigarette rod can pass; a rotatable assembly drum having a number of spaced peripheral assemblage-transporting grooves disposed parallel with the axis of the drum, said drum being arranged beneath said outlet opening so that said lengths can pass singly into successive grooves as said drum rotates; means for feeding stubs into said grooves before they pass said opening; a rotatable transfer wheel having assemblage-transporting flutes which are spaced from each other by a distance greater than the circumferential length of an assemblage and are disposed parallel to the axis of the wheel, the said wheel being geared to transport said assemblages at a higher linear speed than said assembly drum; and a rotatable accelerator wheel provided with teeth adapted to introduce said assemblage to said flutes each of which teeth has a front face which is adapted to engage and accelerate an assemblage received from a groove of said assembly drum and extends substantially radially of said wheel and a rear face formed as a salient curve which merges via a re-entrant portion with the front face of the next tooth.

7. In a cigarette machine having rolling means, apparatus for feeding laterally spaced assemblages of lengths of cigarette rod and stub portions to the rolling means, which apparatus comprises a hopper for lengths of cigarette rod, said hopper having an outlet opening through which single lengths of cigarette rod can pass; a rotatable assembly drum having a number of spaced peripheral assemblage-transporting grooves disposed parallel with the axis of the drum, said drum being arranged beneath said outlet opening so that said lengths can pass singly into successive grooves as said drum rotates; means for feeding stubs into said grooves before they pass said opening; a rotatable transfer wheel having assemblage-transporting flutes which are spaced from each other by a distance greater than the circumferential length of an assemblage and are disposed parallel to the axis of the wheel, the said wheel being geared to transport said assemblages at a higher linear speed than said assembly drum; suction means adapted to retain said assemblages in said flutes while they are being rotated through a predetermined angle; and a rotatable multi-toothed accelerator wheel the teeth of which are adapted to engage assemblages received from successive grooves of said drum and to introduce them into successive said flutes, each said tooth having a front face which is adapted to engage and accelerate an assemblage and extends substantially radially of the wheel and a rear face formed as a salient curve which merges via a re-entrant portion with the front face of the next tooth.

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