

Jan. 16, 1968

G. GAMBERINI

3,363,632

FILTER-TIPPED CIGARETTE MAKING MACHINE

Filed April 14, 1965

6 Sheets-Sheet 1

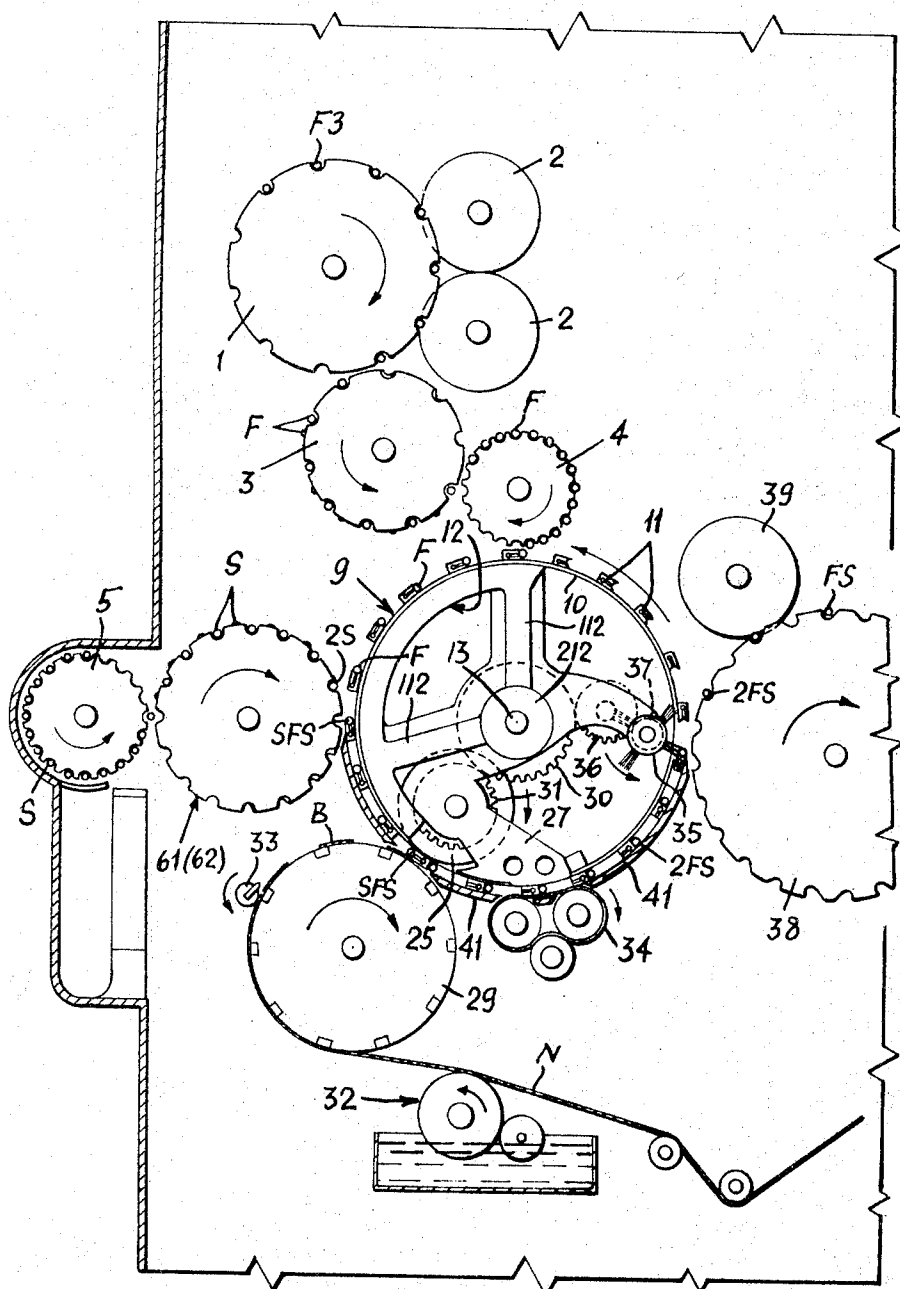


Fig. 1

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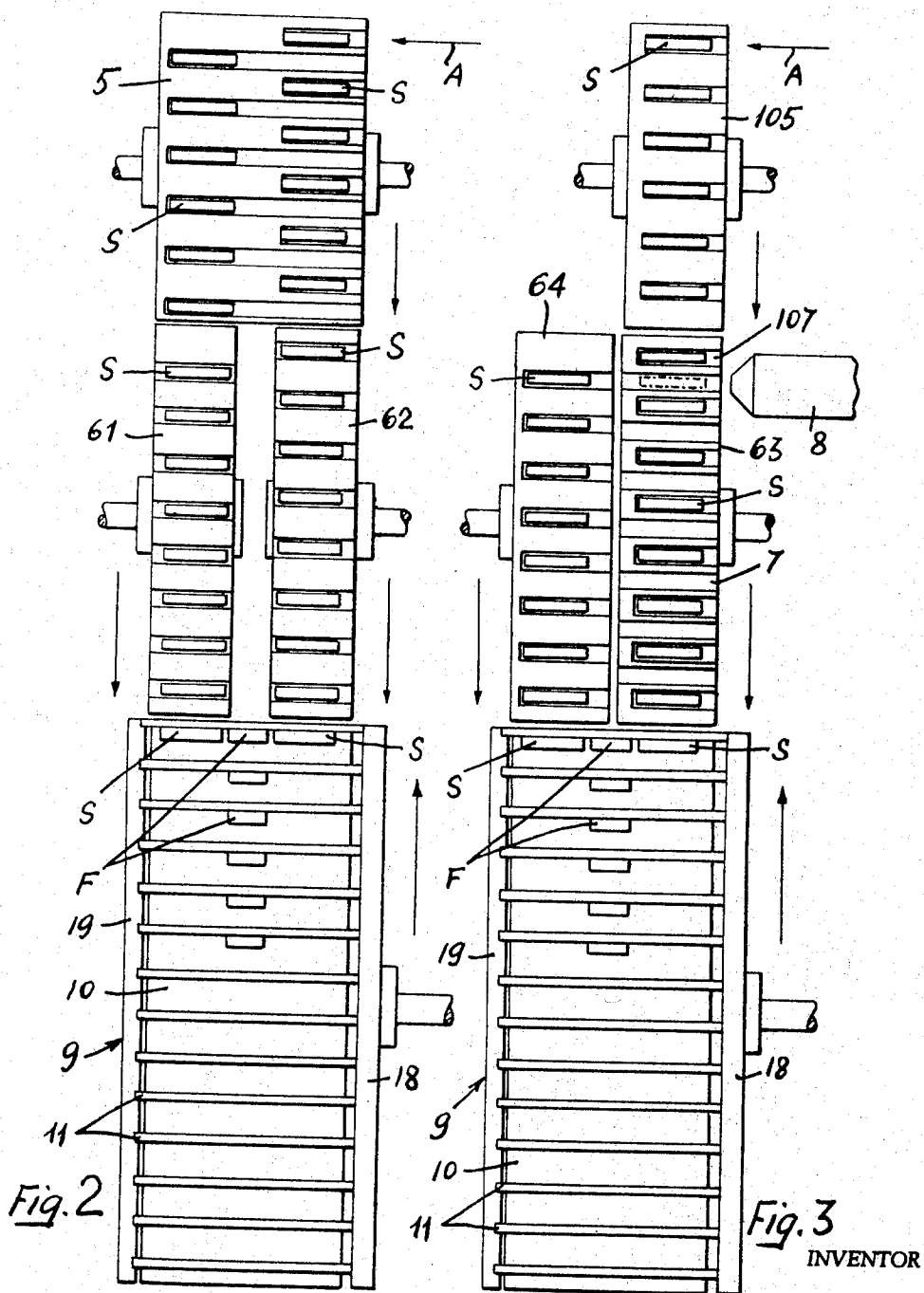
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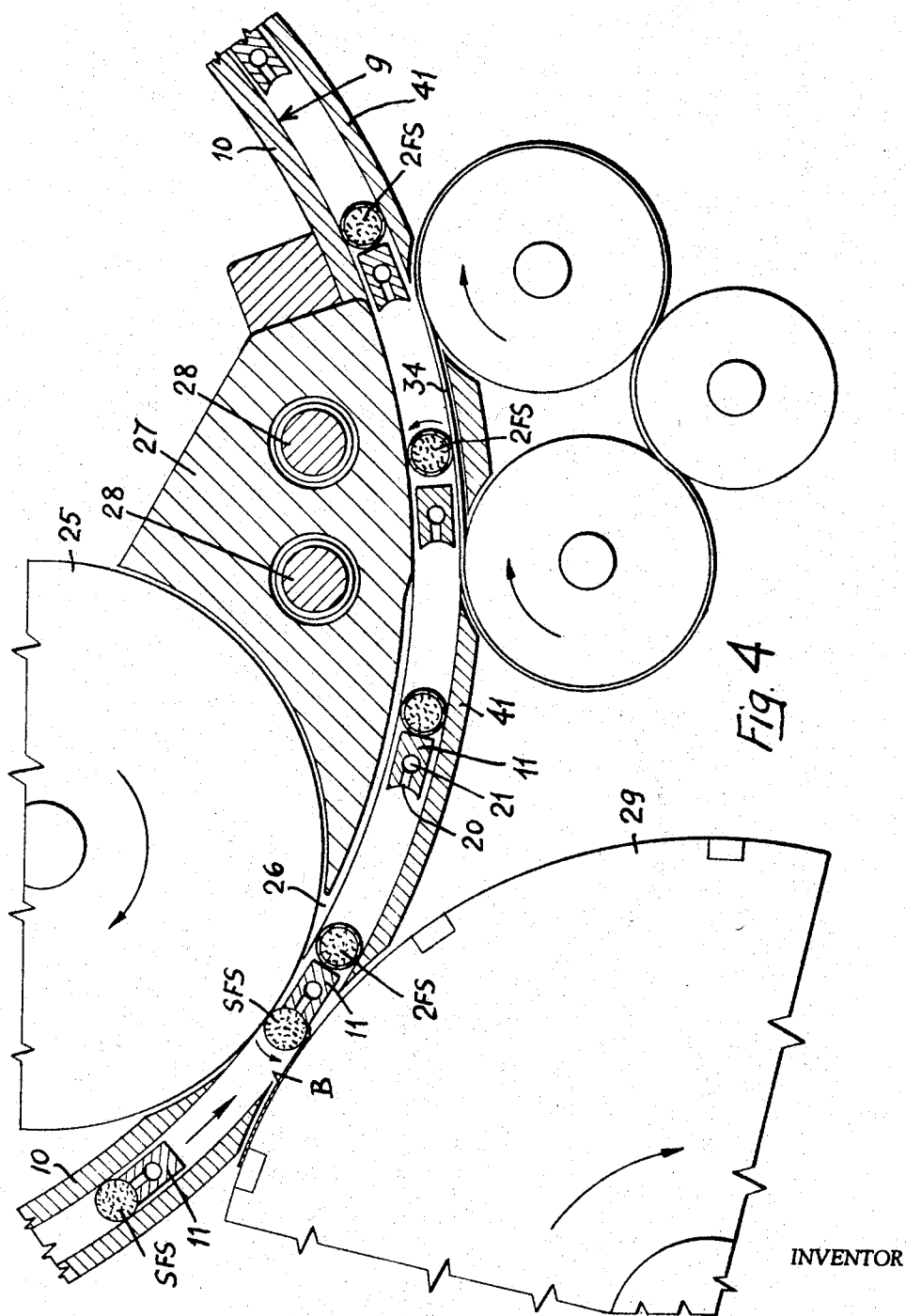
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FILTER-TIPPED CIGARETTE MAKING MACHINE

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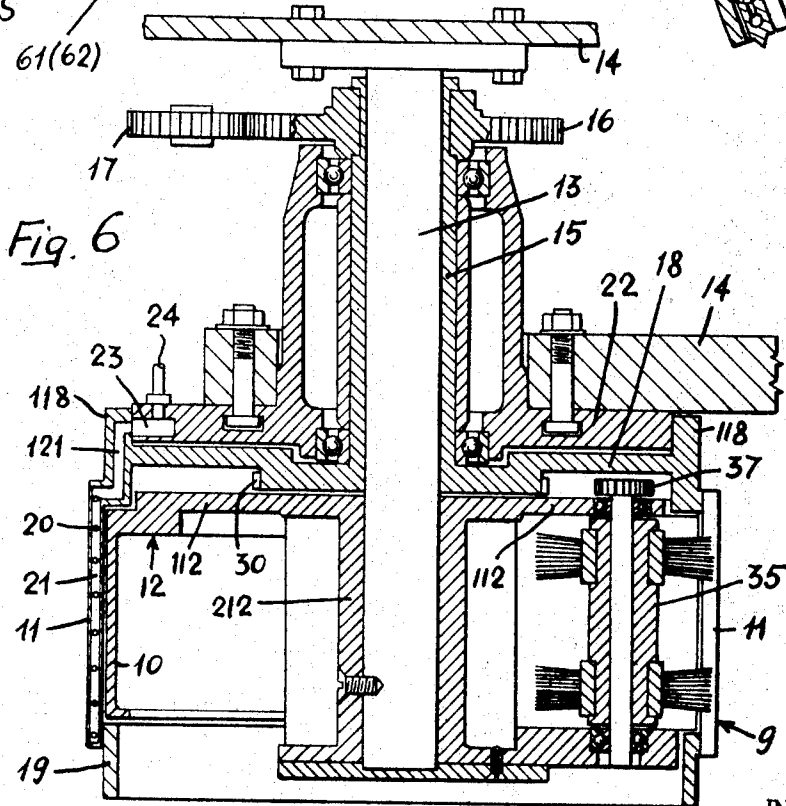
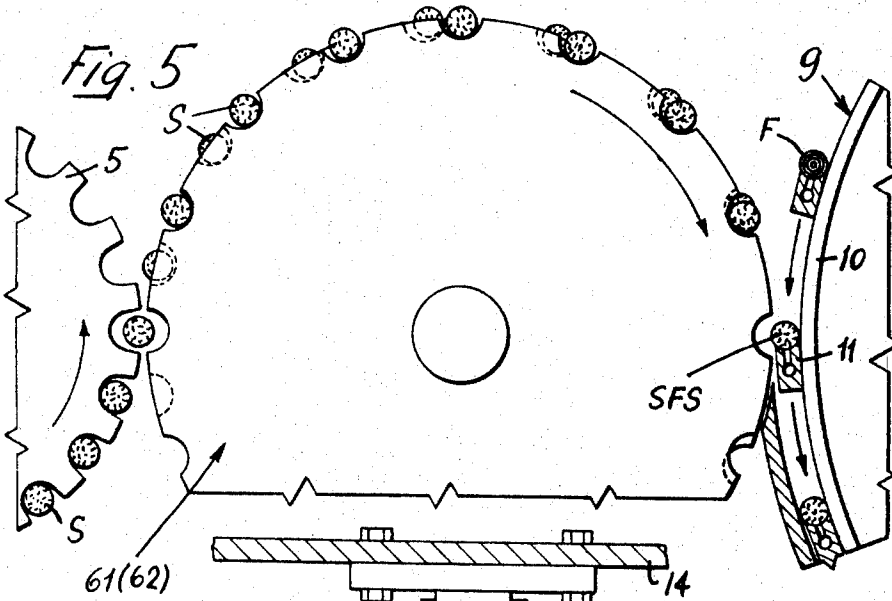
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FILTER-TIPPED CIGARETTE MAKING MACHINE

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FILTER-TIPPED CIGARETTE MAKING MACHINE

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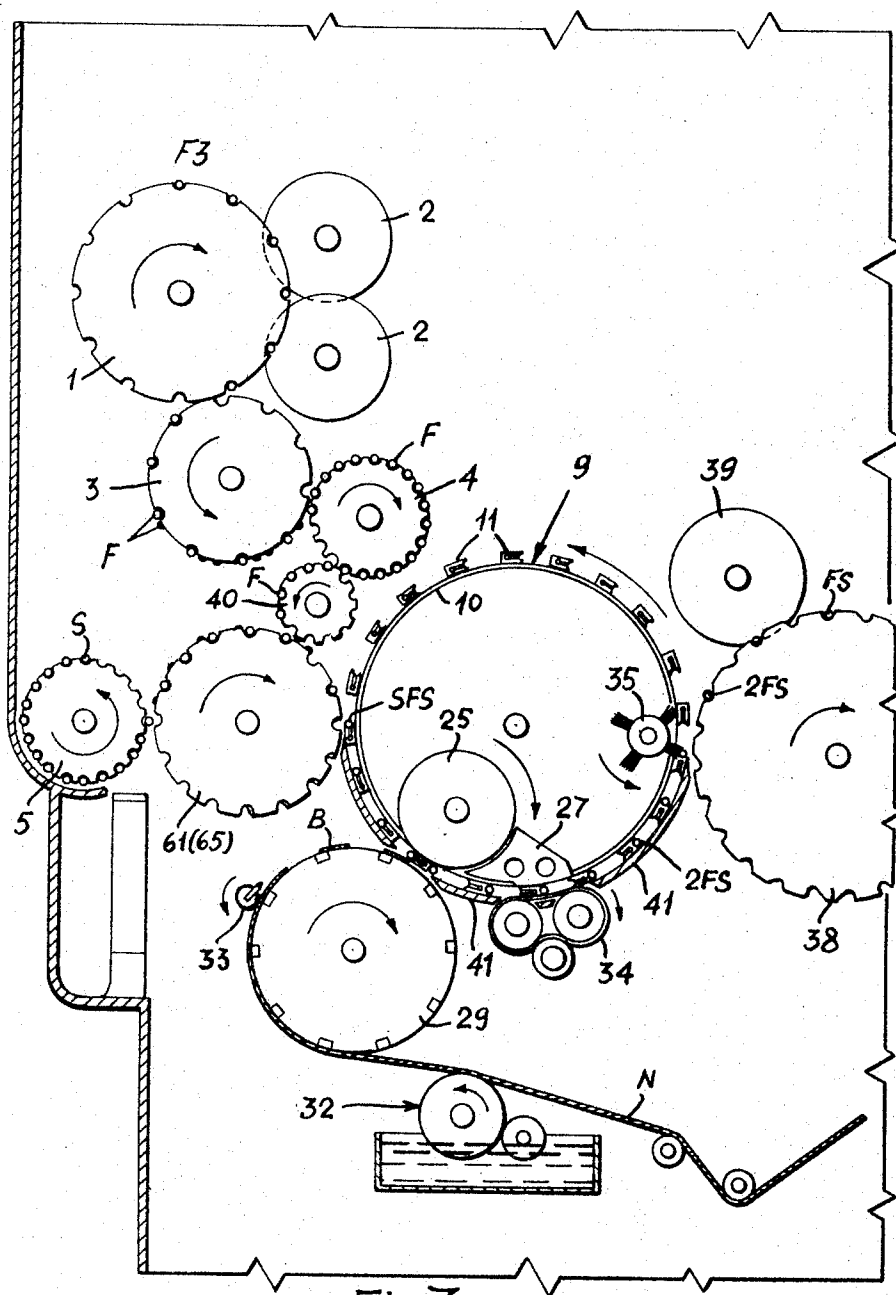


Fig. 7

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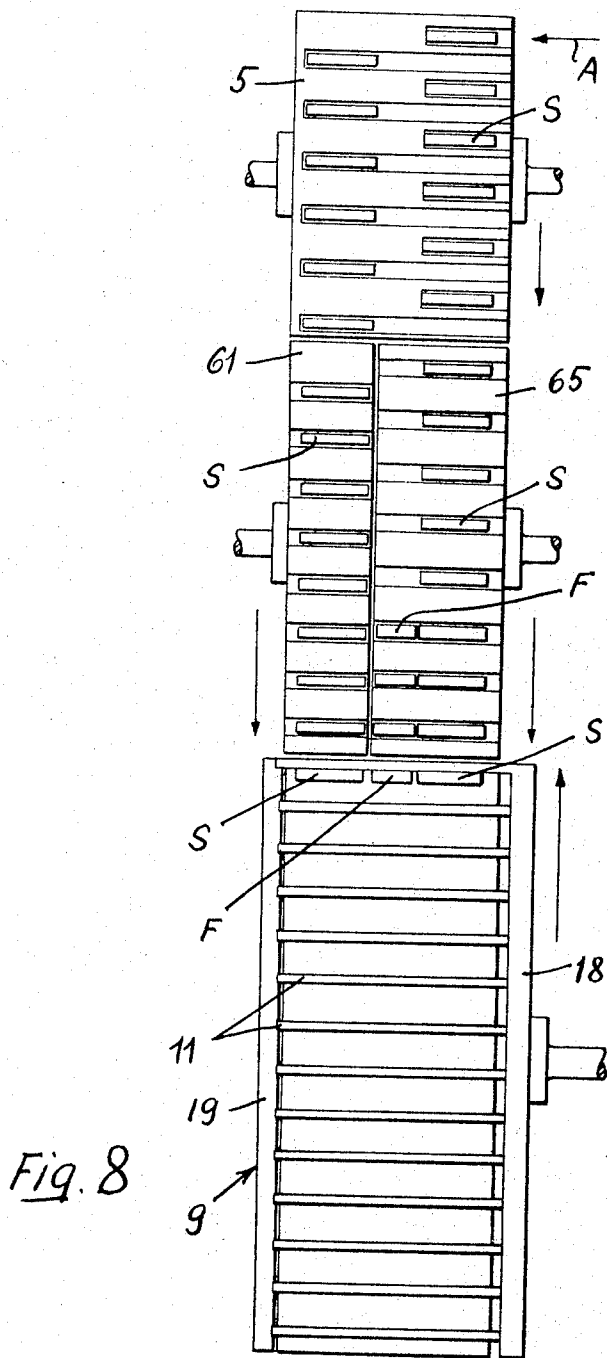
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FILTER-TIPPED CIGARETTE MAKING MACHINE

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3,363,632

FILTER-TIPPED CIGARETTE
MAKING MACHINE

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Claims priority, application Italy, Apr. 16, 1964,

8,728/64

7 Claims. (Cl. 131—94)

This invention relates to machines for the manufacture of mouthpiece cigarettes and particularly of filter-tipped cigarettes of the kind in which a double-length mouthpiece or filter is inserted between two axially spaced lengths of cigarette material and is united thereto by means of a uniting band which is rolled and glued both on the double filter and the adjoining ends of cigarette material, whereafter the "double filter cigarette" is severed into two single filter cigarettes by cutting the said double-length filter. In the following specification the term "filter" shall be understood as including any suitable kind of cigarette mouthpiece.

The known machine of this kind for the manufacture of filter cigarettes, are provided with very complicated means for inserting and aligning the double-length filters between two spaced lengths of cigarette material and for rolling and glueing thereupon the uniting band. Furthermore difficulties are experienced in holding and forwarding the double-filter-cigarettes, at the required high speeds, to the cigarette cutters.

The invention aims to eliminate the drawbacks inherent in the machines of this kind heretofore known by providing a fixed drum or cylinder on which the sets composed of two lengths of cigarette material with a double-length filter inserted therebetween, and which will be called hereinafter "double filter cigarette set" are fed against spaced conveying hollow laths or tubular bars forming a cage encircling said cylinder or drum while inside the same cylinder a wheel is mounted which coacts with an outer uniting-band feed device and serves for revolving or rolling the double cigarettes with the uniting band sticking thereon and rolled so as to straddle the double-length filter and the adjoining cigarette ends; each conveying lath being provided in suitable rear or trailing position with rows of suction openings for holding in position by suction the double filter-cigarette sets against said laths or hollow bars, until said filter-cigarettes come in the position in which the uniting band is applied, after which the suction ceases, in order to permit the application of said band the thickness of said laths or bars being smaller than that of the cigarettes.

According to an embodiment of the invention, the pairs of spaced lengths of cigarette material and the double-length filters to be inserted therebetween may be fed in two different positions of the assembling cage.

According to a further embodiment of the invention, however, the set composed of two lengths of cigarette material and a double-length filter inserted therebetween may be formed upon a pair of fluted wheels from which they may be passed to the assembling cage.

Further objects and characteristic features of the invention will appear from the following specification made with reference to the accompanying drawings, in which:

FIGURE 1 is a schematic elevation, with parts in section, showing the main component parts of a cigarette material and filter tip-assembling mechanism.

FIGURES 2 and 3 show developed in plan two variations of feed arrangement of the spaced pairs of lengths of cigarette material upon the double-length filter and double cigarette-assembling drum.

FIGURES 4 and 5 show in larger scale two particulars of FIGURE 1.

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FIGURE 6 is a horizontal section through a part of the assembling drum.

FIGURES 7 and 8 are views like FIGURES 1 and 2 but relating to a further embodiment of the invention.

The filter-cigarette making machine shown in FIGURES 1 to 6 comprises a fluted revolving drum 1 to which sextuple-length filter plugs F3 are fed from conventional-type magazine (not shown) on which said filter plugs or filters are cut by a pair of revolving disc cutters 2 into three double-length filter plugs or double filters F. These double filters F are each transferred first to one of a set of three co-axial fluted discs forming together a drum 3 and subsequently onto a single fluted drum 4 on which the filters are aligned so as to form a single peripheral row of double filters F. The means for effecting the above operations are known in the art (see for example the U.S. patent specification 3,081,778) and need not to be further described. From this drum 4, the filters are transferred aligned in peripheral direction against the bars 11 of an assembling cage 9 to which spaced lengths cut from a cigarette rod are fed in abutting relation at either end of each double-length filter plug F, as will be better seen hereinafter.

The cut lengths S of cigarette rods or the lengths S of cigarette material are fed into the flutes of a cigarette length-separating suction drum 5.

In the embodiment as particularly shown in FIGURES 2 and 5, at the periphery of suction drum 5 two sets of parallel blind flutes having different lengths are provided, which are all open at the inlet side of the cigarette lengths S and closed at the opposite side, whereby the longer flutes are longer than two complete filter cigarettes to be manufactured, while the shorter flutes, inserted between each pair of longer flutes, have a length which is slightly in excess of one length S of cigarette material, so that between the peripheral row of cigarette lengths S inserted with one end abutting against the blind bottom of the longer flutes and those inserted with one end abutting against the blind bottom of the shorter flutes there is a free space left having a width in excess of a double filter length F.

In the embodiment as shown in FIGURE 2, drum 5 transfers the said two cigarette rows F into the flutes of a pair of spaced co-axial fluted wheels 61 and 62 which have a different number of flutes and which are so keyed and driven at different peripheral rates of speed that the flutes of both wheels 61 and 62 come to be in line only in correspondence of one angular position, this is the transfer position of two axially spaced lengths 2S of cigarette material onto the adjoining filter cigarette assembling cage 9, in aligned relation on both sides of each double-length filter F, as already described with reference to the filter feeding.

The same effect of spaced alignment of the cigarette lengths S is obtained by the embodiment of the device as shown in FIGURE 3, which comprises a disc 105 provided with a number of equal blind flutings in each of which a single cigarette length S is inserted. Adjoining the disc 105 a like disc 63 is mounted which has at its periphery a number of through flutings 7 and, between each pair of through flutings 7, a blind fluting 107. The blind flutings 107 are equal to and spaced between them like those of wheel 105, while the through flutings 7 are spaced between them like the blind flutings 107 and are in line with blind flutings of an adjoining wheel 64 which is provided with blind flutings different in number to the through flutings 7 and wheel 63 and which is driven at a different rate of speed to wheel 63. In line with the crown of flutings 7, 107 a blowing nozzle 8 is mounted, which, when it comes to be in line with the through fluting 7 lying in front of it and containing a cigarette length S transferred therein by wheel 105, blows said

cigarette into the adjoining blind fluting of wheel 64 which in that position, comes to be in line with and constitutes an extension of the adjoining through fluting 7. The result of this arrangement is, as may be clearly seen from FIGURE 3, that, by driving the fluted wheels 63 and 64 at such rates of speed as to promote the aligning of a through fluting 7 of wheel 63 with a blind fluting of the adjoining wheel 64 and the alignment of two blind flutings of the two said adjoining wheels in correspondence to the transfer station of the two cigarette lengths S—S to the adjoining assembling cage 9 to which the double-length filters F have been fed in a row, these cigarette lengths S—S are laid at both ends of the double-length filter F ready to be assembled so as to form a double filter cigarette, as will be better seen hereinafter.

As already mentioned, the double-length filters F and the pairs of spaced cigarette lengths S are transferred from drum 4 and wheels 61–62 or 63–64 respectively to an assembling cage 9, FIGURES 1, 4 and 6. This cage 9 is rotatably mounted upon a fixed hollow cylinder 10 and is formed by a plurality of spaced hollow conveyor laths or bars 11 revolving about said cylinder 10. In the example as shown, the cylinder 10 is fastened by means of a supporting member 12 composed of a hub 212 and radial spokes 112 upon a fixed axle 13 fastened to the machine frame 14. Outside the cylinder 10 upon the axle 13, a hollow shaft 15, (FIGURE 6), is mounted which is positively driven, by a motor (not shown) through a gear pair 16, 17 mounted on one shaft end.

On its opposite end, said shaft 15 carries a disc 18 provided with a peripheral flange 118 which is provided with a number of parallel through bores 121 having substantially a Z-shape and adhering with a fluid-tight fit with their end opposite the cylinder 10 against a fixed disc 22 mounted on bearings upon hollow shaft 15 and fastened to the machine frame 14 as by bolts. The fixed disc 22 is provided at its periphery with a groove 23 extending for a certain peripheral angle of said disc and connected to a duct 24 communicating with a source of suction (not shown). On the open top of said groove 23 there is rotatably mounted with a tight fit a part of said flange 118 in which there open the inlet ends of said parallel through bores 121. Upon the opposite or outlet ends of each of said bores 121 a hollow cage lath or bar 11 is fastened. The lath or bar 11 has axial bore 27 with its inlet end communicating with the outlet end of the corresponding through bore or duct 121, while the opposite end is closed. The bar 11 is fixed to a supporting disc 19 at this closed end. Said hollow cage bars are also provided with a row of suction holes 20 turned towards the rear or trailing bar side. Thus, when the bores 121 come to be in correspondence with groove 23, a suction is generated through hollow bar holes 20, which ceases when the inlet of bores 121 come to be in correspondence with non-grooved parts of disc 22. The thickness of bars 11 is less than a cigarette diameter and their perforated side is preferably concave.

By the hitherto described arrangement, and referring particularly to the embodiment as shown in FIGURE 1, there may be mentioned that the groove 23 extends along the periphery of disc 22 from an angular position slightly in advance of the filter delivery drum 4 to a position past the cigarette lengths delivery wheel pairs 61–62 or 63–64 respectively. Under these conditions, when one of the double filters F carried by the revolving drum 4 comes in proximity of one of the revolving cage bars 11 it is sucked against the rear or trailing side thereof by the suction generated through holes 20. By further revolving, the same bars pass in correspondence with the said cigarette-delivery wheel pairs 61–62 or 63–64 and draw by suction a pair of cigarette lengths on both ends of the filter F already retained thereby, so that after that position, on the suction side (which is opposite to the direction of revolution) of each bar a set composed of three loose aligned pieces comprising two lengths of cigarette

material with interposed double-length filter, and which may be referenced by SFS, is retained by suction. Past this angular position, the suction on the perforated side of the bars 11 ceases and, instead, a curved guide plate 41 is mounted concentrically to cage 9 and slightly spaced from bars 11. In the first section of this plate 41, deflector members of conventional construction are provided for shifting both cigarette lengths S into abutting engagement with the filter F. Also past said angular position at the interior of the hollow cylinder 10, on the supporting member 12, a cigarette-rolling disc 25 is rotatably mounted in correspondence in an opening 26 of the hollow cylinder 10 through which the periphery of said disc 25 comes to be substantially tangent to the periphery of said cylinder 10, as particularly shown in FIGURE 4. Disc 25 is heated, for example by revolving in close proximity with a heating member 27, provided with electric heating resistances 28 and forming a part of the periphery of cylinder 10. Disc 25 is integral of gear 31 driven by gear 30 integral of disc 18, FIGURE 6.

In the front of rolling disc 25 outside of cylinder 10, a uniting-band feeding and applying suction drum 29 is mounted. This suction drum 29 receives and holds by suction the leading end of the continuous band N which is provided with adhesive applied to its exterior surface by roll 32. The continuous band N is cut at regular intervals by a cutting device 33 and as it is fed by known means (not shown) at a speed which is less than the peripheral speed of suction drum 29, the continuous band N slips on the drum 29, while the cut band lengths B come to be spaced from the leading end of the said continuous band N. A part of the periphery of said suction drum 29 protrudes through an opening of said guide plate 41 into contact with the set of double cigarette and filter SFS which, as it is no longer retained by suction, by coming into contact with the adhesive face of the uniting bands B, rolls freely away from the trailing suction side of the hollow bar 11, to which it was attached, towards the leading side of the preceding bar 11, by which it is pushed forwards and caused to roll in proximity of the heating member 27. In correspondence of said heating member 27 an endless band 34 positively driven forwards at a greater rate of speed than laths or bores 11 and passing through slits of curved plate 41 provides for a positive rolling of the double filter cigarettes SFS, united together by a band B, into contact with the said heating member 27, in order to completely dry the adhesive.

In the position of cylinder 10 in which the double filter cigarettes SFS are well united by a band B pasted thereto, the guide plate 41 ceases and in front of its end, a fluted suction drum 38, positively driven at the unison with cage bars 11, takes the double filter cigarettes over from those of the bars which are just coming out of plate 41. Said cigarettes are pushed towards said drum 38 by a revolving brush 35 driven by gear 30 through gear pair 36–37, as shown in FIGURES 1 and 6. The double-filter cigarettes 2FS on the drum 9 are severed into single-filter cigarettes FS by means of a revolving cutter blade 39 and are then further conveyed to a suitable collecting device (not shown).

In the just-described embodiment, first the double-length filters F and then the set SFS composed of two lengths of cigarette material and a double-length filter must be subjected to suction along a wide arc of circumference extending from the filter-carrying drum 4 to the rolling disc 25.

In order to reduce the application of suction to a narrower arc, the arrangement as shown in FIGURES 7 and 8 has been devised, according to which onto each revolving cage bar a complete double cigarette-filter set 2FS is transferred from a pair of adjoining and co-acting fluted wheels 61–65.

According to this embodiment, the cigarette lengths S fed into the alternatively long and short blind flutes of drum 5, as described with reference to FIGURE 2, are

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transferred into the flutes of the adjoining wheels 61-65 which are provided with a different number of flutes and are driven at differential speed so that the flutes of both wheels come to be in line once at each complete revolution. The flutes of wheel 61 may contain only one length S of cigarette material while the flutes of wheel 65 may contain, in addition to one length of cigarette material S, also a double-length filter F. The filters F are fed in a suitable position into the flutes of wheel 65 in substantially abutting relation to one length of cigarette material S from the filter feed wheel 40 which receives the double-length filters F from drum 40.

From the position of wheels 61 and 65 in which the flutes are aligned (see last flutes in FIGURE 8) the set of pieces SFS is transferred against the next-lying bar 11 of cage 9, as clearly shown in FIGURE 8. It is thus apparent that, the remaining parts of the device being left as they were, the arc of circumference of the cage 9 along which the suction should be maintained is reduced to about one-half, or even less, than in the previous embodiment.

What is claimed is:

1. Apparatus for transferring rod-like articles such as cigarettes, comprising a cylinder, an annular cage located about said cylinder, means for revolving said cage about said cylinder, said cage comprising a plurality of parallel elongated members spaced concentrically about said cylinder having means for suctionally holding said rod thereto, a source of suction and means for selectively applying said source to each of said members to move said rod from one position to another along the surface of said cylinder.

2. Apparatus for applying a uniting band to an assembly of filter plugs and cigarette rods, comprising means for feeding said plugs, rods and uniting bands to an assembly mechanism comprising a cylinder, a curved plate segment spaced from said cylinder a distance approximately the diameter of said assembly for rolling said assembly therebetween, an annular cage located about said cylinder and between said plate segment, said cage comprising a plurality of parallel elongate members spaced about said cylinder, each having means for suctionally holding said assembly, means for rotating said cage about said cylinder, a source of suction communicating with said members and means for applying suction to said elongate members when in position to receive said plugs and rods and to discontinue suction when receiving uniting bands and when rolling said assembly between said cylinder and plate segment.

3. The mechanism according to claim 2 wherein the elongate members each comprise a tubular bar, having an

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axial bore closed at one end and open at the other, means for fastening said closed end to the rotating means, a duct connecting said open end to the source of suction and a row of holes along a side of said bar to hold said plugs and rods.

4. The mechanism according to claim 3 wherein the cage is rotated so that the holes are positioned along the trailing edge of the bar.

5. The apparatus according to claim 2 wherein the cylinder is hollow and is provided with an aperture in a position in which the suction to the corresponding elongate members is discontinued, and a drum projecting out of said opening substantially tangentially to the outer surface of said cylinder and means for heating said drum, and wherein the means for feeding the uniting bands comprise a wheel disposed in opposed relationship to said drum, the whole being so arranged that by co-action of said wheel and said drum, predetermined lengths of uniting band, coated with wet adhesive, are fed, rolled and dried upon the plug and cigarette rods.

6. The apparatus according to claim 5 wherein the means for heating the projecting drum comprises a fixed heating body mounted in close proximity thereto and electric resistances inserted in said fixed heating body, said body extending in close proximity of the path of the cage beyond said projecting drum and band-applying wheel, an endless band mounted through a pair of slits in said curved plate segment at a point beyond the band feeding wheel and in opposition to said heating body, guide and tensioning rolls and driving roll for driving said endless band, in the direction of movement of said assemblies against the said heating body at a speed greater than the movement of said cage.

7. Apparatus according to claim 2 characterized by the feature that the tubular bars have a hollow profile at their trailing perforated side and have a thickness that is slightly less than the diameter of one cigarette.

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