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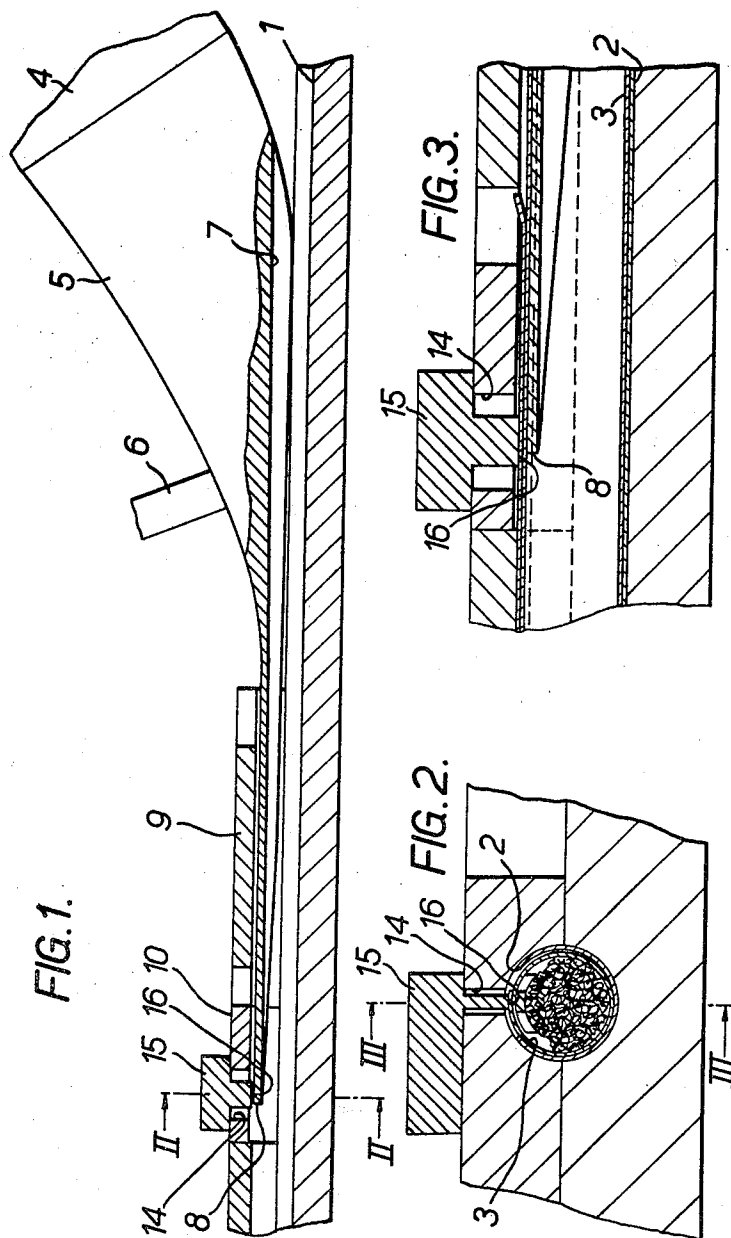
D. T. N. WILLIAMSON ETAL

3,171,415

MANUFACTURE OF CIGARETTES

Filed July 2, 1963

2 Sheets-Sheet 1



INVENTORS  
David T. N. Williamson  
Douglas Wm. B. Muir  
By Watson, Cole, Hendler & Watson  
ATTORNEYS

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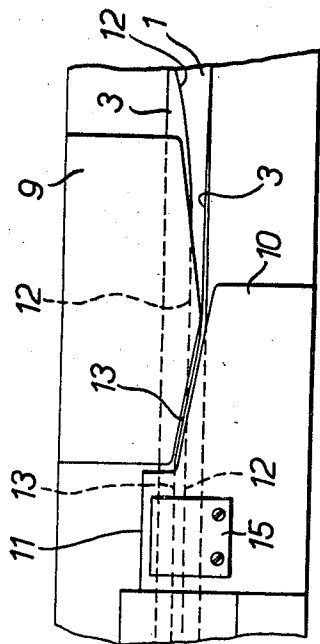


FIG. 4.

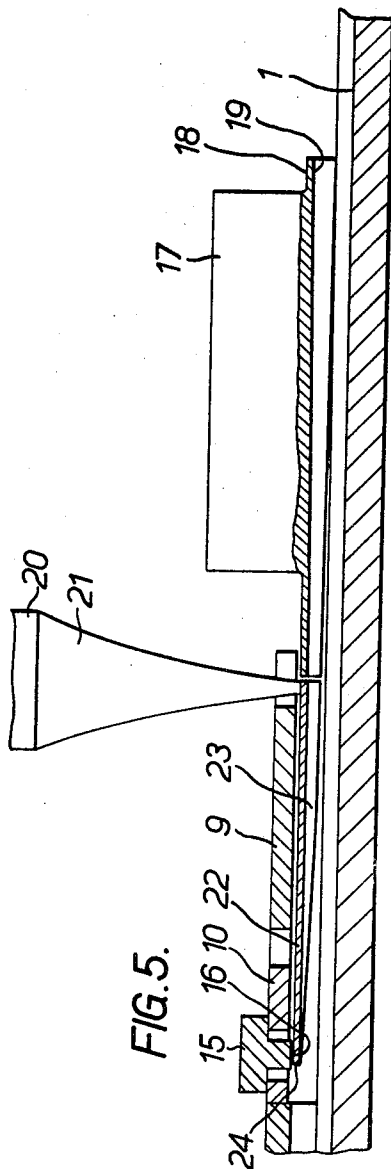


FIG. 5.

INVENTORS

David T. N. Williamson

Douglas Wm. B. Muir

By Watson, Cole, Grindle & Watson  
ATTORNEYS

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## MANUFACTURE OF CIGARETTES

David Theodore Nelson Williamson and Douglas William Ballantyne Muir, Deptford, London, England, assignors to Molins Machine Company Limited, London, England, a British company

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2 Claims. (Cl. 131—66)

This invention concerns improvements in or relating to the manufacture of wrapped rods, and in particular to apparatus for wrapping a filler, such as a tobacco filler, in a continuous wrapper, such as a cigarette-paper web, in a continuous rod making machine, such as a continuous rod cigarette-making machine.

It is to be understood that the term "tobacco filler," when used herein, is intended to denote not only a filler consisting wholly of tobacco, but also any filler suitable for incorporation in a wrapper to form a cigarette rod, and includes, for example, a filler consisting of portions of tobacco between which are spaced mouthpiece portions, as is sometimes used in the manufacture of mouthpiece cigarettes. Further, the word "filler" is to be understood as including a filler of any material, e.g. filtering material, which is enclosed in paper or the like to form a continuous rod.

In our copending application, Serial No. 289,883, filed June 24, 1963, there is disclosed in a continuous rod cigarette-making machine, apparatus for wrapping a tobacco filler in a paper web, comprising folding means to fold the web about the filler so that one edge portion overlaps the other edge portion of the paper web, an element positioned to lie between the filler and the overlapping paper edge portions, and an ultrasonic vibratory device having a welding tip arranged to act on the overlapping paper edge portions against the said element to weld the edge portions together to form a seam running lengthwise of the wrapped cigarette rod.

According to the present invention there is provided in a continuous rod cigarette-making machine, apparatus for wrapping a tobacco filler in a continuous moving cigarette-paper web to form a continuous cigarette rod, comprising folding means to fold the wrapper about the filler so that edge portions of the wrapper overlap, an ultrasonic vibratory device including a mechanical impedance transformer, a compression tongue having a vibrating tip and formed by a coupler of said mechanical impedance transformer so shaped and positioned between the filler and the overlapping edge portions of the wrapper as to compress the filler as it is being wrapped, and a member so positioned that the overlapping edge portions pass between the vibrating tip of the tongue and the member whereby the overlapping edge portions are welded together by the vibrating action of the tip against the member.

Apparatus in accordance with the invention will now be described by way of example with reference to the accompanying drawings, in which:

FIGURE 1 is a section through part of a continuous rod cigarette-making machine,

FIGURE 2 is a section on the line II—II of FIGURE 1, drawn to a larger scale,

FIGURE 3 is a section on the line III—III of FIGURE 2,

FIGURE 4 is a plan view of part of the apparatus shown in FIGURE 1,

FIGURE 5 is a view similar to FIGURE 1 showing another embodiment according to the invention.

Referring to FIGURES 1, 2, 3 and 4, the apparatus

comprises a U-shape trough 1, which has converging side walls, through which a conveyor tape 2 (not shown in FIGURES 1 and 4) can travel from right to left as viewed in FIGURE 1. A paper web 3 (also not shown in FIGURES 1 and 4) carrying a tobacco filler, is conveyed on the tape 2 through the trough 1, which folds the tape and paper into U-shape to partially enclose the filler.

An ultrasonic vibratory device, in the form of a mechanical impedance transformer having a transducer 4 and a coupler 5, is positioned above the trough 1, the coupler 5 being supported at a node of vibration by a support 6. The lower surface of the coupler 5 defines a longitudinal groove 7, which is arcuate in cross section and which narrows and becomes less deep towards the downstream end 8 of the coupler. The top of the groove 7 is also sloped downwardly towards the end 8, so that the tobacco filler passing beneath the coupler is gradually compressed as it travels downstream along the groove 7, the coupler 5 thus being shaped and positioned to act as a compression tongue for the filler.

Positioned above the coupler 5 towards its downstream end, are two guide parts 9 and 10, which are shown in plan in FIGURE 4 (from which the coupler 5 has been omitted for clarity). The parts 9 and 10 are shaped to guide the edge portions of the paper web 3 into overlapping relationship to enclose the filler. The guide part 9 extends over the trough 1 from one side thereof, the portion of the part 9 above the trough having in its underside a longitudinal groove which is arcuate in cross-section. The part 10 extends over the trough 1 from the other side thereof, and is also provided at its underside with an arcuate, longitudinal groove, which, at the downstream end portion 11 of the part 10, is substantially semi-circular, and, together with the trough 1, forms a substantially cylindrical channel. As the paper web 3 travels along the trough 1 the paper edges move upwardly at both sides of the coupler 5. The paper edge 12 (FIGURE 4) is then guided inwardly and downwardly over the downstream end of the coupler 5 by the shaped guide part 9. The paper edge 13 passes between the parts 9 and 10 and is guided inwardly and downwardly by the part 10 to overlap the edge 12. The paper edges are then held in overlapping relationship against the upper surface of the downstream end of the coupler 5 by the portion 11 of the part 10.

An aperture 14 (FIGURES 1, 2 and 3) is provided in the portion 11 of the guide part 10 immediately above the end 8 of the coupler 5. A member 15, having a narrow rectangular surface 16, is attached to the part 10 so that the surface 16 projects slightly through the aperture 14 and can bear on the overlapping paper edge portions against the end 8 of the coupler 5.

The end 8 of the coupler 5 executes ultrasonic vibrations and welds the overlapping paper portions together against the surface 16 of the member 15 to form a welded seam running lengthwise of the wrapped cigarette rod, the width of the welded seam being determined by the width of the surface 16. The high frequency vibration of the coupler 5 tends to reduce friction between the tobacco filler and the coupler, and thus assists the passage of the filler. The ultrasonically welded, wrapped cigarette rod then passes to cut-off mechanism to be severed into individual cigarette lengths.

Referring to the alternative arrangement shown in FIGURE 5 (in which like parts are indicated by the same references used in FIGURES 1, 2, 3 and 4), there is provided, mounted on a support 17 above the trough 1, a compression tongue 18 having a longitudinal groove 19 similar to the groove 7 previously described. An ultrasonic, mechanical impedance transformer, comprising a transducer 20 and a coupler 21, is positioned above the

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trough 1 immediately upstream of the guide part 9. A tip 22, attached to the coupler 21, forms an extension to the tongue 18, the tip 22 having a tapering groove 23 corresponding to the groove 19. When the mechanical impedance transformer operates, the downstream end 24 of the tip 22 executes ultrasonic vibrations.

In the embodiment shown in FIGURE 5, a paper web carrying a tobacco filler is conveyed through the trough 1 on a conveyor tape, and the paper edge portions are folded into overlapping relationship about the end 24 of the tip 22 in a manner as previously described. The vibrating end 24 of the tip 22 then welds the overlapping paper portions together against the surface 16 of the member 15. The tip 22 assists in the compression of the tobacco filler, and its high frequency vibration again tends to reduce friction and thus assists the passage of the filler beneath the tip.

What we claim as our invention and desire to secure by Letters Patent is:

1. In a continuous rod cigarette-making machine, apparatus for wrapping a tobacco filler in a continuous moving cigarette-paper web to form a continuous cigarette rod, comprising fold means to fold the wrapper about the filler so that edge portions of the wrapper overlap, a compression tongue having a vibrating tip so shaped and

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positioned between the filler and the overlapping edge portions of the wrapper as to compress the filler as it is being wrapped, and a member so positioned that said overlapping edge portions pass between said vibrating tip of said tongue and said member and an ultrasonic vibratory device coupled to said compression tongue to vibrate said tip against said member, whereby said overlapping edge portions are welded together by the vibrating action of said tip against said member.

2. The apparatus as in claim 1 wherein said vibratory device is a mechanical impedance transformer.

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25 SAMUEL KOREN, *Primary Examiner*.