Nov. 21, 1939. F. F. RUAU 2,180,481

VARIABLE SPEED GEARING

Filed Nov. 30, 1936 3 Sheets-Sheet 1

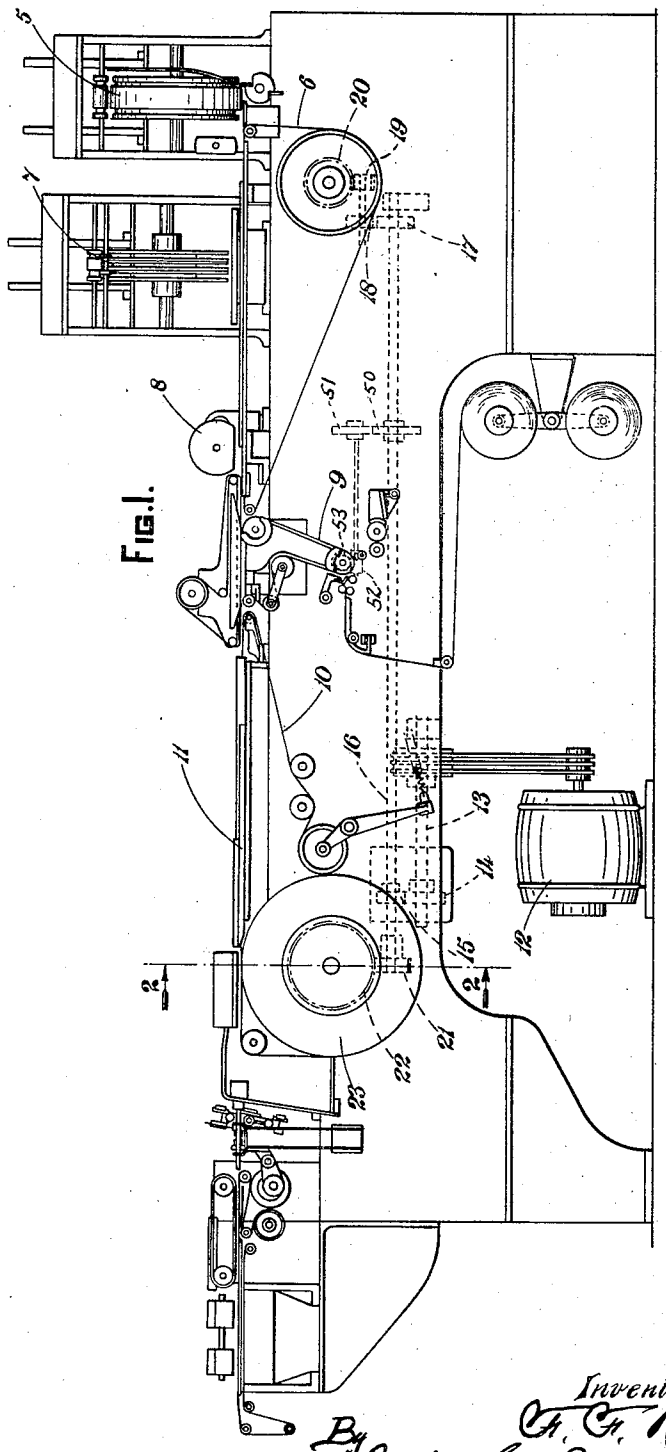


FIG. 1.

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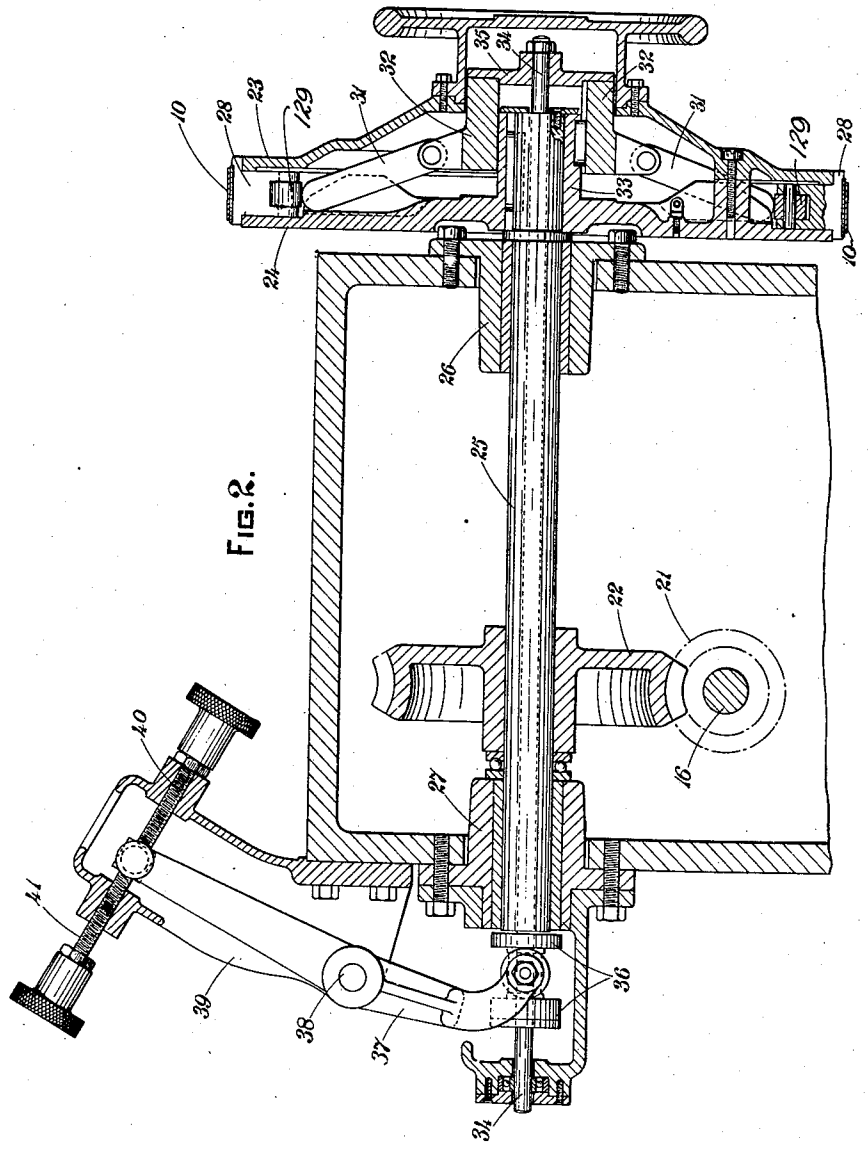


FIG. 2.

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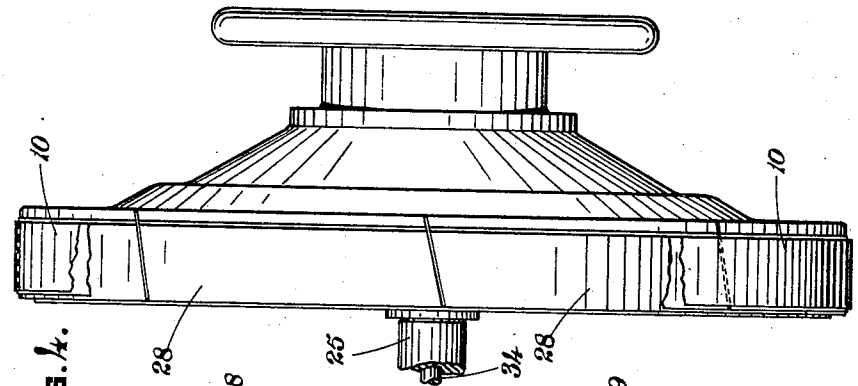


FIG. 4.

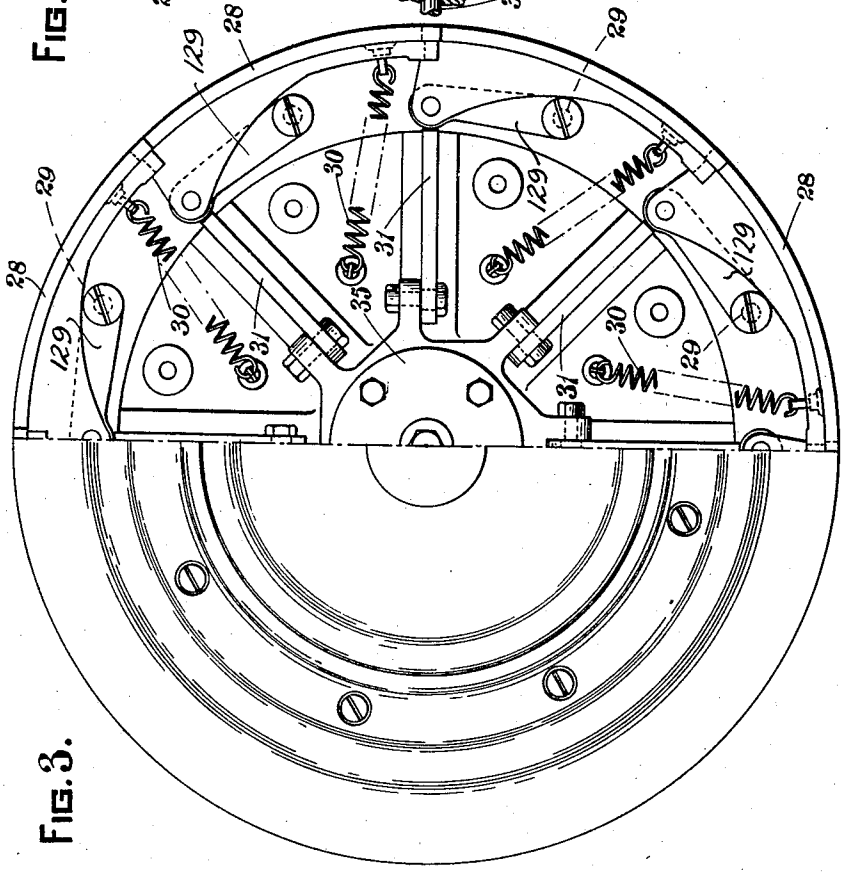


FIG. 3.

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UNITED STATES PATENT OFFICE

2,180,481

VARIABLE SPEED GEARING

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Application November 30, 1936, Serial No. 113,513
In Great Britain December 28, 1935

1 Claim. (Cl. 131—39)

This invention is for improvements in or relating to variable speed gearing for cigarette machines.

According to the present invention there is provided in an automatic cigarette making machine having driving mechanism to drive various moving parts of said machine, said moving parts including a conveyor or other device, the provision of a variable speed gear interposed between the conveyor or other device and the driving mechanism, said gear being capable of adjustment within fine limits whilst the machine is in operation to produce small differences in the speed of the conveyor or other device relatively to the speed of the driving mechanism and to the speed of the remaining moving parts of the machine driven by said driving mechanism.

The variable speed gear may comprise an expanding pulley, a part at least of the periphery of which is formed by an element arranged for movement towards and away from the axis of rotation of the pulley, means connected with said element to effect movement of the element relatively to the axis of rotation of the pulley, and an operating member movable lengthwise of the axis of rotation of the pulley to operate said means.

The element may be pivotally mounted on a support attached to a rotatable shaft, said element being resiliently urged towards the centre of rotation and controlled by link mechanism connected with a sliding member arranged to slide in a direction parallel with the axis of rotation of the pulley and operated by an adjusting member. The rotatable shaft may comprise a hollow shaft and the operating member (e. g., a link) may extend through the hollow portion of the shaft, one end of the operating member being connected with a sliding member, the other end of the operating member being connected with the adjusting member. The adjusting member may comprise a pivotally mounted bell crank lever, one end of which is forked and connected with said link. The adjusting member may be provided with a micrometer adjusting means.

The invention will be described by way of example with reference to the accompanying drawings in which—

Figure 1 is a side elevation of a machine for making mouthpiece cigarettes and illustrates diagrammatically the application of the invention to such machine.

Figure 2 is a section on the line 2—2 Figure 1.

Figure 3 shows a part of Figure 1 drawn to an enlarged scale.

Figure 4 is a side elevation of Figure 3.

Like references refer to like parts throughout the specification and drawings.

The machine shown in Figure 1 of the drawings is of the kind described in United States Patent No. 2,156,600 and in British patent specifications Nos. 430,742, 430,817 and 430,818 for making mouthpiece cigarettes by uniting axially moving stubs and cigarettes. In such machines it is sometimes found difficult to ensure that the cigarettes and stubs will be in proper endwise abutting relationship (that is, when it is desired to have the cigarettes and stubs abutting) owing to the fact that due to various reasons the lengths of the cigarettes and stubs are apt to be different by very minute amounts.

In machines such as those shown in the specifications above referred to, cigarette rod lengths, each of which is double the length required in the finished cigarette, are fed from a magazine 5 and are deposited on to the surface of a core feeding conveyor comprising an endless band 6, the successive cigarette rod lengths being spaced apart from each other in an axial direction. In the spaces between the successive cigarettes double length stub portions are fed from a magazine 7, and the core formed by the line of alternate cigarette rod lengths and stub lengths is moved by the conveyor 6 to timing mechanism shown generally at 8, which timing mechanism is arranged to engage the rear faces of the cigarette rod lengths or the stub lengths to locate the cigarette and stub lengths relatively to the wrapping material which is fed to the cigarette and stub lengths by a suction band 9 which runs at a constant speed. The cigarette and stub lengths together with the wrapping material are then delivered on to the surface of a further conveyor 10, which latter conveyor moves the composite core together with the wrapping material through folding mechanism 11 operative to fold the wrapping material about the cigarette rod lengths and stub lengths comprising the composite core to unite the lengths.

The suction band 9 and conveyor 10 are moved at a slower speed than that at which the conveyor 6 is moving in order that the cigarette lengths and stub lengths which are spaced apart on the conveyor 6 may be closed up in an axial direction. As stated above, it is frequently found that the materials fed to the mouthpiece cigarette making machine vary from time to time. When such is the case it is found to be desirable to alter the speed of the conveyor 10 relative to the speeds of suction band 9 and conveyor 6 in order to cor-

rect minute inconsistencies which are noticed during the running of the machine.

From Figure 1 it will be seen that the suction band 9 and conveyors 6 and 10 are driven from a source of motive power shown in the drawings as an electric motor 12, the shaft of the motor 12 being connected with a stub shaft 13, the stub shaft 13 being connected by means of gear wheels 14 and 15 to the main shaft 16 of the mouthpiece cigarette making machine. The suction band 9 and conveyors 6 and 10 respectively are each driven directly from the main shaft 16, the conveyor 6 being driven through the medium of gear wheels 17, 18, 19 and 20, whilst the conveyor 10 is driven by gear wheels 21 and 22. The suction band 9 is driven through the medium of gear wheels 50, 51, 52 and 53, the lineal speed of the suction band being the same as the normal speed of the conveyor 10. The details of the driving mechanism for the conveyor 6 and suction band 9 are fully described and illustrated in United States Patent No. 2,156,600, as are also the details of the mechanism for driving conveyor 10, except for the improvement thereon embodied in the present invention. Between the conveyor 10 and the driving mechanism therefor there is interposed a variable speed gear shown in the drawings as an expanding pulley 23. The pulley 23 is arranged to be expanded or contracted whilst the machine is in operation so that small differences may be made to the speed of the conveyor 10 to adjust the speed of the conveyor 10 relatively to that of the conveyor 6, and also to that of the mechanism which drives the conveyor 10.

The expanding pulley 23 is shown more clearly in Figures 2, 3 and 4, and comprises a support in the form of a disc 24, the disc 24 being fixed to a rotatable shaft 25 mounted in bearings 26 and 27. To the disc 24 there is connected a plurality of segmental elements 28 which are arranged so that the end of one element overlaps the end of the next in the manner shown in Figure 3. By this arrangement the segmental elements 28 comprise the periphery of the expanded pulley. The segmental elements 28 connected with links 129 are pivoted at 29 to the disc 24, and springs 30 (see Figure 3) urge the segmental elements 28 towards the axis of rotation of the pulley, and maintain the segments in the overlapping formation shown in Figure 3.

A link 31 is pivoted at one end to a slidable member 32 which is arranged to slide on the boss 33 by which the disc 24 is secured to the shaft 25 while the free end of the link 31 abuts against that end of the link 129 which is connected with the element 28. The slidable member 32 is arranged to slide in a direction which is parallel to the axis of rotation of the pulley, i. e., the axis of rotation of the shaft 25.

The shaft 25, to which the disc 24 is secured, is a hollow shaft, and an operating member shown as a rod 34 is arranged to be coaxial with and to extend through the shaft, one end of the rod being connected with the slidable member 32 by a connecting piece 35 (see Figure 2). The other end of the rod 34 is provided with a collar 36 which is fixed to the rod 34.

The rod 34 is operated by an adjusting member shown as a bell crank lever 37 pivoted at 38 to a bracket 39 fixed to the bed of the machine. As will be seen from Figure 2, one end of the bell crank lever 37 is forked and engages with the collar 35. The other end of the bell crank lever forms an operating lever by means of which the segmental elements 28 forming the periphery of the expanding pulley are adjusted.

The operating lever is controlled by a micrometer adjustment formed by two oppositely disposed screws 40 and 41 arranged to engage with the operating lever of the bell crank lever 37.

By adjusting the screws 40 and 41, the bell crank lever 37 is pivoted at 38, and the rod 34 is thereby moved axially in the shaft 25, thus causing the slidable member 32 to slide on the boss 33 and the segmental elements 28 to be moved towards or away from the axis of rotation of the expanding pulley, thereby adjusting the diameter of the pulley and consequently the speed at which the conveyor 10 is moved. It will be appreciated that by means of the micrometer adjustment obtained through the screws 40 and 41 minute adjustments of the expanding pulley may be effected whilst the speed of the driving mechanism remains constant. The arrangement is such that the adjustments may be made whilst the machine is in operation, and this fact enables the machine operator to vary the speed of the conveyor 10 relatively to the driving mechanism, because as will be appreciated from the foregoing description, whilst the pulley 23 is rotated at a constant speed by the gearing 21 and 22 the surface speed of the conveyor 10 is varied, due to the increasing or decreasing diameter of the pulley.

What I claim as my invention and desire to secure by Letters Patent is:

In a machine for manufacturing mouthpiece cigarettes, the combination of a core feeding conveyor comprising an endless band to feed an axially moving core of axially aligned cigarettes and mouthpieces, mechanism for feeding short lengths of wrapping material to adjacent elements in said core, a slower moving endless band conveyor to continue the axial movement of the axially aligned cigarettes and mouthpieces together with the short lengths of wrapping material, said last named conveyor moving at a slower linear speed than the said core feeding conveyor, driving mechanism for such slower moving conveyor, a variable speed gear interposed between the slower moving endless band conveyor and the driving mechanism therefor, and means for adjusting the transmission ratio of said variable speed gear within fine limits while the machine is in operation to produce small differences in the speed of the said slower moving endless band conveyor relatively to the core feeding conveyor and to the mechanism for feeding the short lengths of wrapping material whereby compensation for minute variations in the lengths of elements in the core may be effected.

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