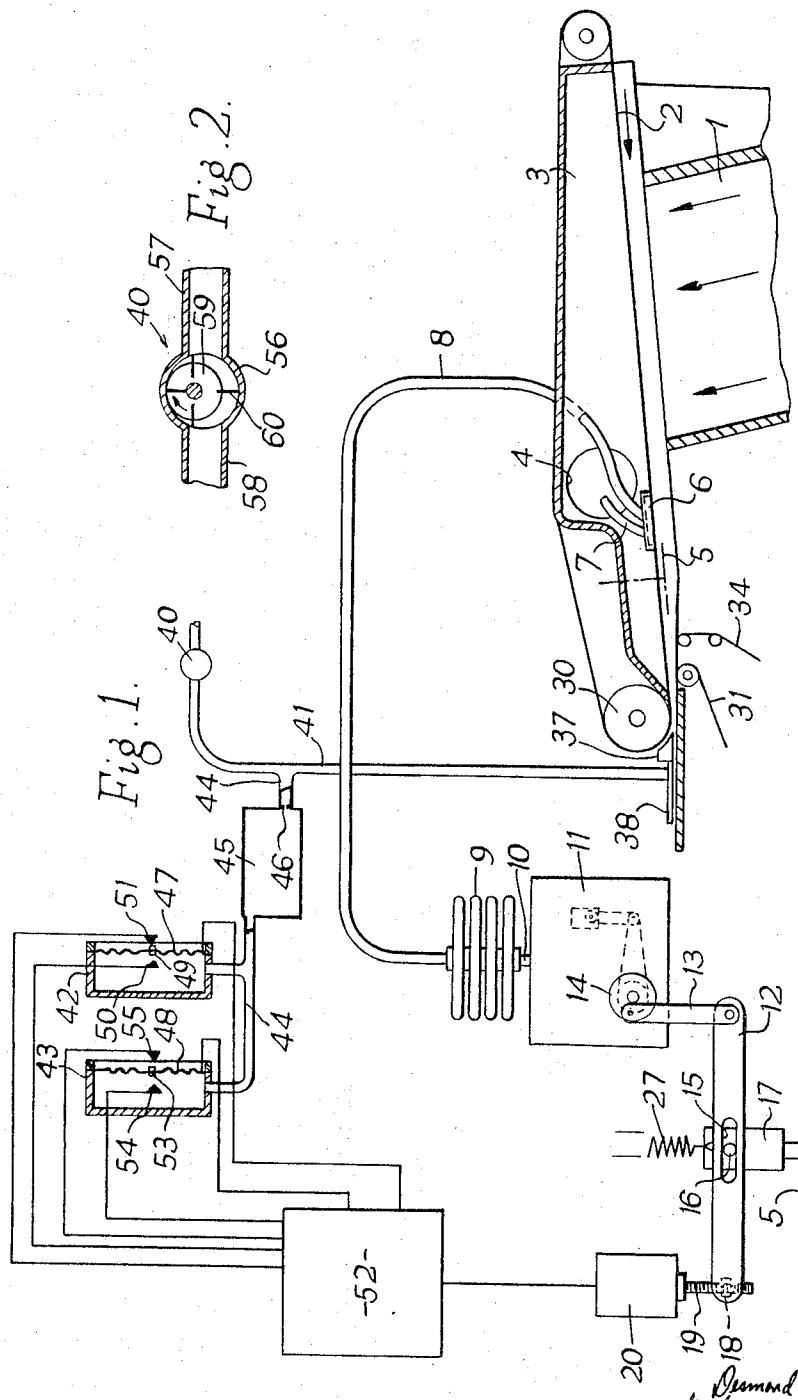
Feb. 28, 1967 D. W. MOLINS ETAL 3,306,304

TOBACCO-MANIPULATING MACHINES

Filed June 26, 1961

6 Sheets-Sheet 1



INVENTORS
Desmond W. Molins
Gordon F. W. Powell
Frederick Pocock
BY
Watson, Cole, Grindle & Watson
ATTORNEYS

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6 Sheets-Sheet 2

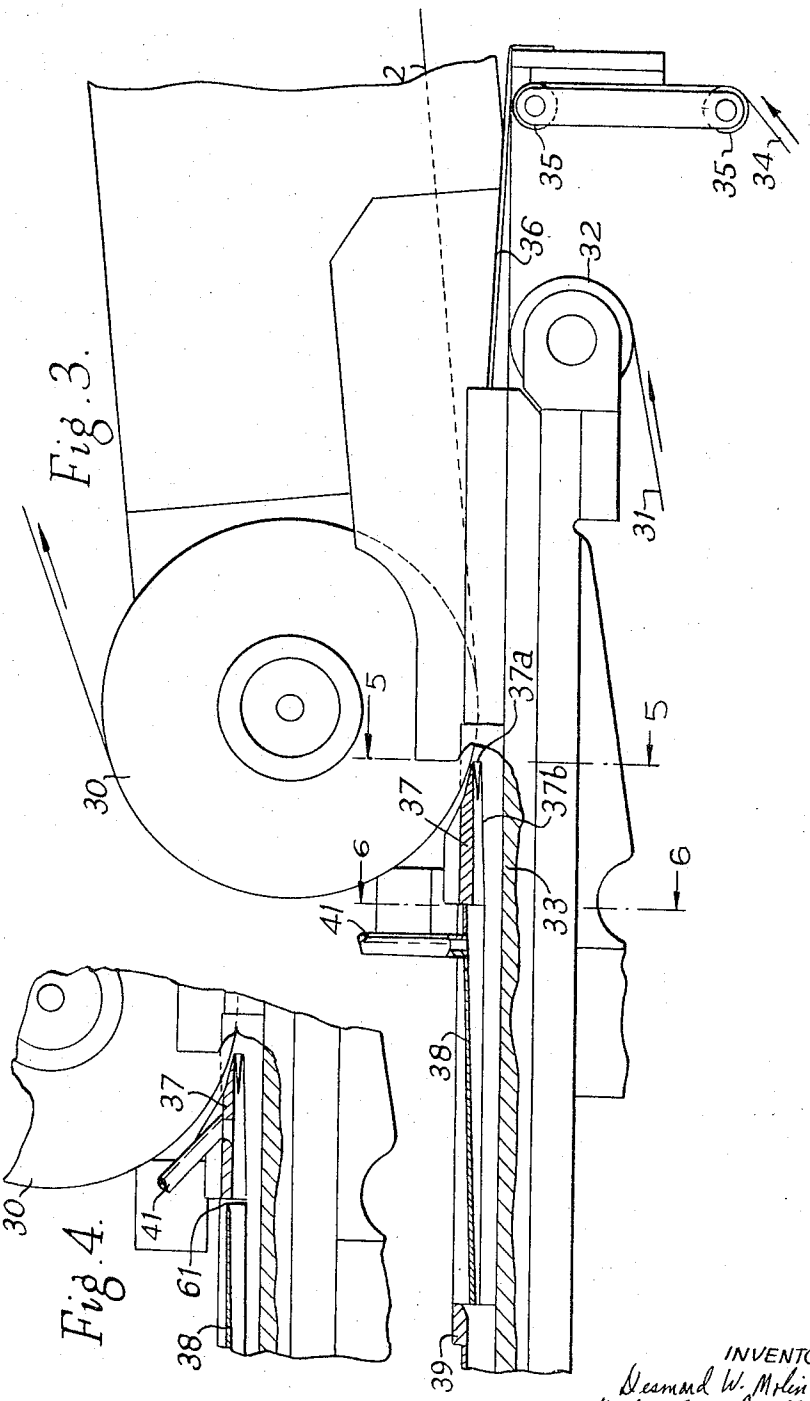

Fig. 3.

Fig. 4.

INVENTORS
Desmond W. Molins
Gordon F. W. Powell
BY Frederick Pocock
Watson, Cole, Grindle & Watson
ATTORNEYS

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Fig. 5.

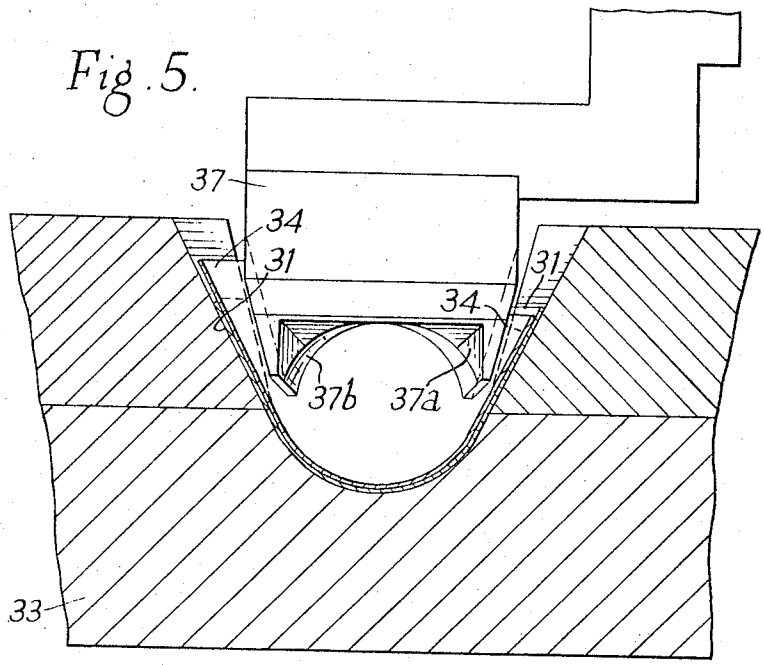
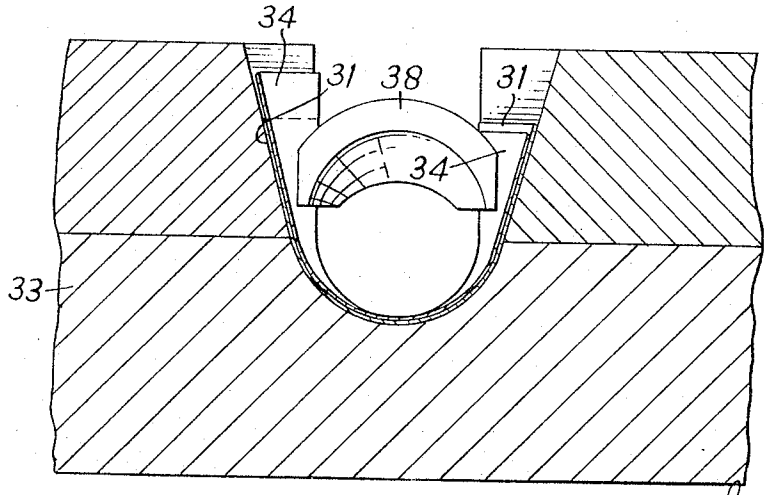


Fig. 6.



INVENTORS
Desmond W. Molins
Gordon J.W. Powell
Frederick Pocock
BY
Watson, Cole, Grindle & Watson
ATTORNEYS

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Fig. 7.

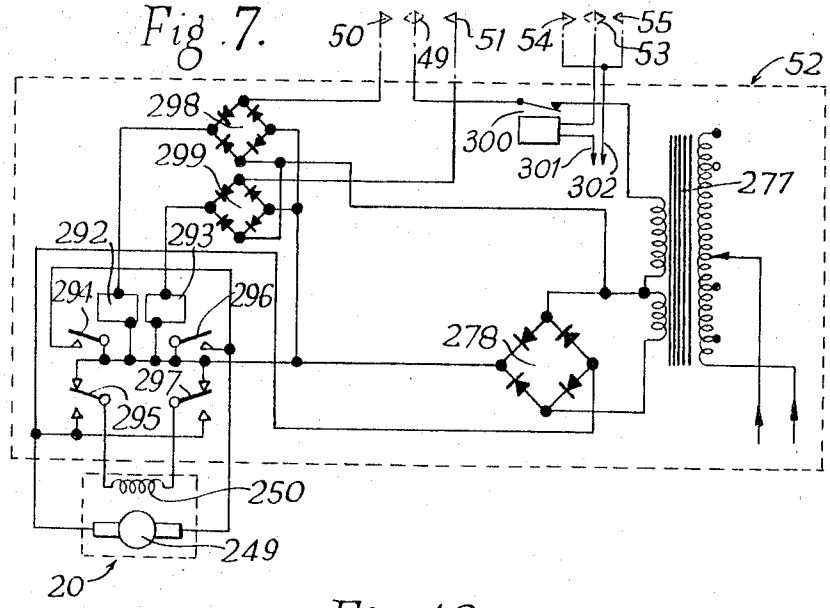
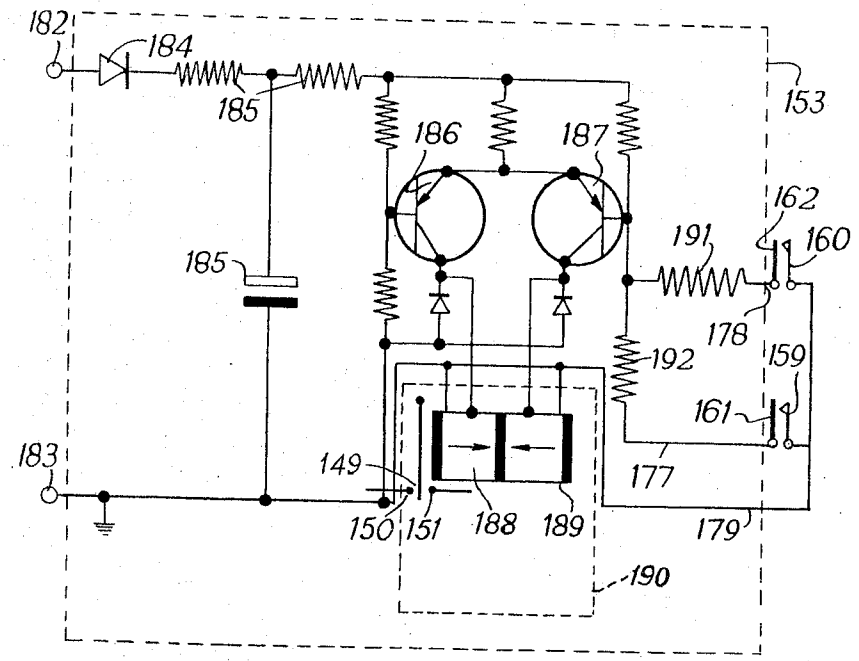


Fig. 10.



INVENTORS
Reginald W. Molins
Gordon F.W. Powell
Frederick Pocock

BY

Watson, Cole, Grindle & Watson

ATTORNEYS

Feb. 28, 1967 D. W. MOLINS ETAL 3,306,304

TOBACCO-MANIPULATING MACHINES

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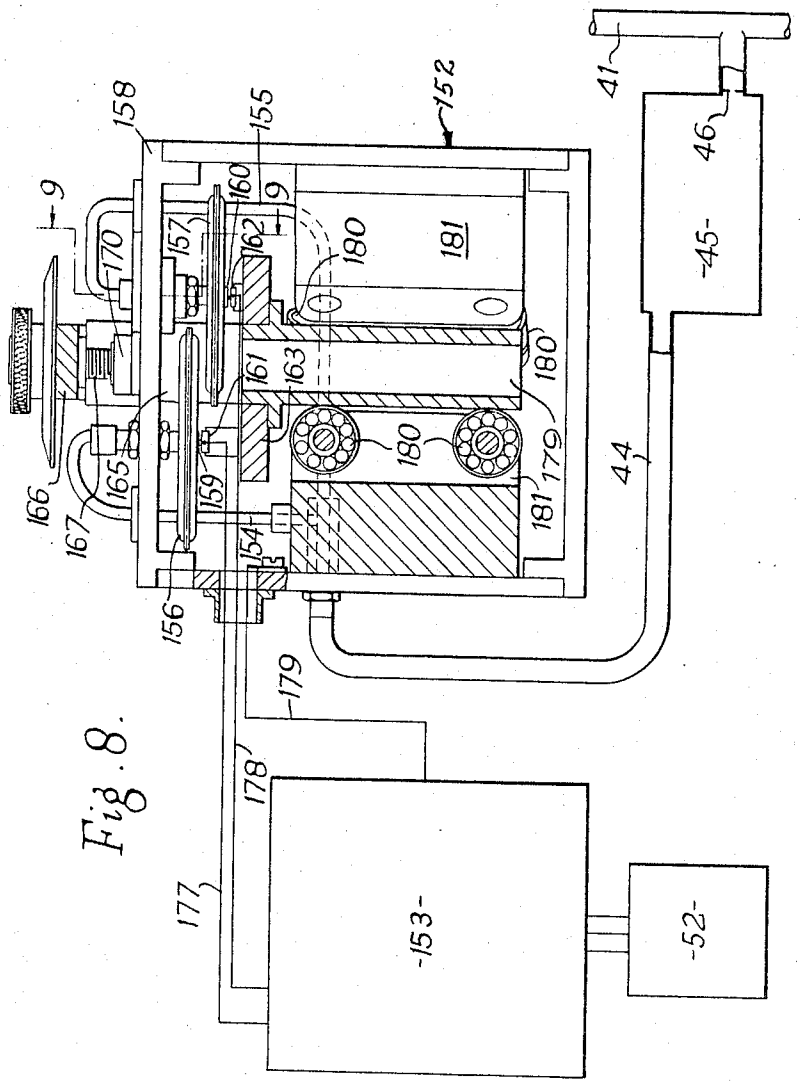

Fig. 8.

INVENTORS
Desmond W. Molins
Gordon J. W. Powell
Frederick Pocock
BY
Watson, Cole, Grindle & Watson
ATTORNEYS

Feb. 28, 1967 D. W. MOLINS ETAL 3,306,304

TOBACCO-MANIPULATING MACHINES

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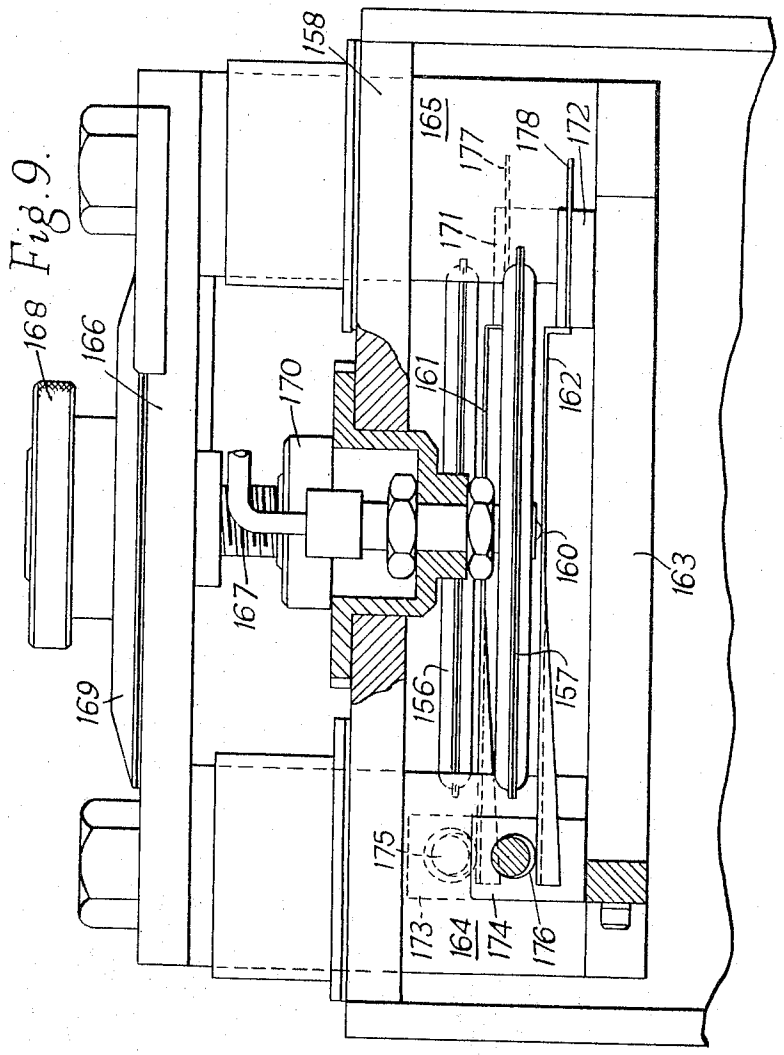
Fig. 9.



INVENTORS
Desmond W. Molins
Gordon F. W. Orwell
Frederick Porsek

BY
Watson, Cole, Grindle & Watson
ATTORNEYS

United States Patent Office

3,306,304

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3,306,304

TOBACCO-MANIPULATING MACHINES

Desmond Walter Molins, Gordon Francis Wellington Powell, and Frederick Pocock, London, England, assignors to The Molins Organisation Limited, a British company

Filed June 26, 1961, Ser. No. 119,436
Claims priority, application Great Britain, June 29, 1960, 22,772/60
8 Claims. (Cl. 131—21)

This invention relates to continuous rod cigarette-making machines. In such machines a continuous tobacco filler stream is formed and is conveyed through a rod-forming mechanism in which a continuous paper wrapper is wrapped around the stream to form a continuous cigarette rod.

It is an object of the present invention to detect variations in the quantity of the tobacco along the filler stream, and accordingly, the filler stream is carried on a conveyor between side walls which form an open trough with the conveyor, and through a confining passage of fixed cross-sectional area, that is, the cross-sectional area at each given point along the passage length does not change although the areas at different points may of course differ, which passage is formed by the trough and a compression member. Air is passed through the tobacco which is confined in the passage, and variations in the effect on the air of variations of the quantity of tobacco are detected.

The compression member may be the tongue or compression shoe of the machine.

It is a further object of the present invention to utilize the variations in the said effect on the air to control the quantity of tobacco in the filler stream and, accordingly, pressure variations in the air are used to control the operation of a trimming device acting on the tobacco filler stream to vary the amount of tobacco trimmed from the stream.

One embodiment of apparatus constructed and arranged to operate in accordance with the present invention will now be described, by way of example, with reference to the accompanying drawings, of which:

FIGURE 1 shows diagrammatically, in front elevation, part of a continuous rod cigarette-making machine,

FIGURE 2 shows, in section, an enlarged detail of a fragment of FIGURE 1,

FIGURE 3 shows partly in section an enlarged and more detailed view of another part of FIGURE 1, and includes a compression shoe and tongue,

FIGURE 4 is a view, partly in section, corresponding to part of FIGURE 3 and showing a modified air feed arrangement,

FIGURE 5 is a view, partly in section, on the line 5—5 of FIGURE 3,

FIGURE 6 is a view, partly in section, on the line 6—6 of FIGURE 3,

FIGURE 7 is an electrical circuit diagram for the arrangement shown in FIGURE 1,

FIGURE 8 is a front elevation with parts removed and partly in section of a modification of the machine of FIGURE 1,

FIGURE 9 is a section on the line 9—9 of FIGURE 8 on a larger scale, and

FIGURE 10 is a further electrical circuit diagram for the modification of FIGURE 8.

In the cigarette-making machine shown in FIGURE 1, a continuous tobacco filler is formed and suctionally held on the underside of a perforated metal conveyor band. A narrow passage **1** extends upwardly to a perforated endless conveyor band **8** which runs, in the direction shown by the arrow, across the upper part of the passage.

A suction chamber **3** extends above and along the lower run of the conveyor band **2**, and air is drawn from the chamber **3** through a pipe **4** by a suitable fan, not shown. The arrangement is such that a stream of air flows up through the passage **1** at high velocity and is drawn through the perforated conveyor band. Cut tobacco is fed into the passage so as to be impelled upwardly towards the conveyor, on which it builds up to form a filler and on which it is held by suction. The arrangements for feeding the tobacco are as disclosed in Patent No. 3,030,965, granted April 24, 1962.

Beyond the passage **1**, i.e. to the left of the passage as viewed in FIGURE 1, is a trimming device comprising a pair of rotating discs **5** positioned beneath the conveyor band, which cooperate to trim excess tobacco from the filler. One only of the pair of discs is illustrated because the other disc of the pair is behind and in line with the one shown.

These discs **5**, whose position relative to the conveyor band **2** is diagrammatically represented in FIGURE 1 by dot and dash lines, are arranged side by side so that their opposed edges cooperates to trim the filler at a desired distance from the conveyor band **2**. The arrangement is in general similar to that disclosed in Patent No. 3,030,966, granted April 24, 1962, or in Patent No. 3,032,041, granted May 1, 1962.

The same one of the pair of trimming discs **5** is also shown diagrammatically in full line at the lower left in FIGURE 1, but not in its correct position relative to the band **2**, in order to illustrate the manner in which, in accordance with the invention, the discs are raised and lowered to vary the amount of tobacco trimmed from the filler. Once again, the other disc of the pair is not shown because it is behind and in line with the illustrated one.

Within the suction chamber **3** and directly above and touching the band **2** at a position just to the right of the discs **5** as viewed in FIGURE 1, is a small chamber **6**. This chamber **6** is open at its lowermost side so as to permit air to pass into it through the perforations in the conveyor band **2**. A small pipe **7** communicating with the chamber **6** extends from the latter into the pipe **4**.

Also communicating with the chamber **6** is a pipe **8** which extends from the chamber to a stack of flexible air capsules making up a bellows **9** so that the pressure within the bellows corresponds to that in the chamber **6**.

Fixed to the lower face of the bellows is a rod **10**. The bellows are so mounted and arranged that the lower face, and thus the rod **10**, are caused to move up or down in response to changes in air pressure in the bellows. The rod **10** is the input member of an hydraulic amplifier device indicated schematically at **11**. At the output end of the amplifier, a crank **14** is rocked in response to movement of the rod **10**, and a link **13** is correspondingly moved up or down. The link **13** is pivotally connected to the right hand end of a lever **12**.

The lever **12** has a central slot **15** which accommodates a pin **16** extending from a housing **17** which forms a mounting for the trimming discs **5**. A spring **27** urges the housing upwardly.

At the end of the lever **12** remote from the link **13** is a block **18** provided with a threaded aperture through which extends a screw **19**, which is arranged to be rotated by a reversible electric motor **20**.

The apparatus as so far described and depicted only diagrammatically in FIGURE 1 is illustrated and described in more detail in FIGURES 1 to 10 of Patent No. 3,089,497, granted May 14, 1963, except as to the manner in which the electric motor **20** is controlled.

Referring now to FIGURES 1 and 3, the perforated conveyor band **2** passes around a pulley at its left and

right hand ends, the left-hand pulley being numered **30**. Below this pulley **30**, and to the right, a garniture tape **31** is shown passing counterclockwise around a pulley **32** to enter the garniture trough, indicated generally at **33**, and shown partly in longitudinal section in FIGURE 3. To the right of the pulley **32**, a continuous paper wrapper **34** passes over two pulleys **35**, **35** in counterclockwise direction to pass into the garniture trough **33** above the garniture tape **31**. The continuous paper wrapper **34** has its edges turned up by entry into the trough **33** to form a U-section, the nearer edge of the paper wrapper being indicated at **36** in FIG. 3.

Adjacent the bottom left-hand quadrant of the pulley **30** is a compression shoe **37**. FIGURE 3 also shows the trough **33** with part broken away in the region of the shoe **37**. The right-hand end of the shoe **37** acts to scrape tobacco off the band **2** on the pulley **30**. The cross-sectional shape of the shoe **37** and the manner in which this shape changes along the length of the shoe can be seen from FIGURES 3 and 5. The entry portion **37***a* of the shoe is rectangular and is followed by a curved portion **37***b*. Immediately following the compression shoe **37** (to the left in FIGURE 3) is a tongue **38**, the shape of which can be seen from FIGURES 3 and 6. These figures also show the trough **33** with part broken away in the region of tongue **38**. FIGURES 5 and 6 also show the trough **33** to be in section a splayed U at this region, there being a clearance between each side of the shoe **37** and the tongue **38** and the walls of the trough **33**, through which the edges of the tape **31** and the paper **34** pass.

The continuous tobacco filler carried on the band **2** is transferred on to the paper wrapper **34** underneath the pulley **30**, where suction is cut off from the filler. A more detailed view of the construction of the machine in this region, and the manner in which the filler is transferred on to the paper wrapper, is contained in the Patent No. 3,030,965.

The paper wrapper **34**, downstream of pulley **30** and with the continuous tobacco filler on it, is drawn under the compression shoe **37** and the tongue **38** by means of the garniture tape **31**. The filler is compacted to at least half its final degree of compaction in the wrapped rod as it enters the shoe **37** and further laterally compacted while passing under the shoe **37**, and is then further laterally compacted during passage under the tongue **38** to a degree slightly greater than required in the wrapped cigarette rod, the paper wrapper being then folded over the filler by the folders, part of which is shown at **39**.

To control the electric motor **20** the following arrangement, which is shown in FIGURE 1, is adopted. Air is drawn from atmosphere into a positive displacement pump **40** and passed under pressure through a pipe **41** into the tongue **38** a short distance from the right-hand end. The end of the pipe **41** is chamfered where it enters the tongue so as not to present a sharp edge to the tobacco which might impede its flow. The pressure in the pipe **41** is communicated to the interiors of two chambers **42** and **43** via a pipe **44**, in which is interposed an integrating chamber **45**, with a restricted entry **46**.

The chamber **42** has as its right-hand wall a flexible diaphragm **47**, and the chamber **43** has a similar diaphragm **48**. The diaphragm **47** has at its centre an electrical contact **49**, and on opposite sides of this contact are further contacts **50** and **51**. These latter contacts are spaced from the contact **49** so that when a certain change in pressure occurs in the pipe **41** the contact **49** will contact one or other of contacts **50** or **51**, depending on whether the change in pressure is an increase or a decrease. These contacts are connected in an electrical control circuit indicated schematically at **52**, which is generally similar to the lower part of the circuit shown in FIGURE 11 of Patent No. 3,089,497. The arrangement is such that the reversible motor **20** is energised to rotate in one direction if contact **50** touches contact **49**, and in the other direction if contact **51** touches contact **49**, and the motor continues to run until the pair of contacts part again. The circuit indicated **52** is shown in detail in FIGURE 7.

Similarly, the diaphragm **48** carries a contact **53**, and on each side of this contact are further contacts **54** and **55**. These three contacts are also connected to the control circuit, and the completion of a circuit by contact **53** touching either contact **54** or contact **55** is arranged to operate a relay to stop the motor **20** running. The contacts **54** and **55** are spaced a greater distance from the contact **53** than the contacts **50** and **51** are spaced from the contact **49** so that a bigger pressure change in pipe **41** is necessary before the contact **53** touches either contact **54** or contact **55** than is the case with contact **49** with regard to contact **50** or contact **51**.

Referring now to FIGURE 7, D.C. supply to the armature **249** of the motor **20** is provided by the rectifier **278**, and the direction of the current is controlled by two magnetically operated switches **292** and **293** supplied from rectifiers **298** and **299** respectively each having two control arms **294**, **295** and **296**, **297** respectively. Movements of the contact **49** to touch contact **50** or **51** will complete a circuit to one of the switches **292** and **293** and the respective relay contacts will feed current to the armature **249**, field **250** and the motor will run one way or the other according to the circuit made and raise or lower the trimming device **5**. Alternatively, or in addition, the motor **20** could be made to adjust a variable speed ratio device to alter the speed of the tobacco-feeding apparatus.

By means of relay switch **300** it is arranged that the line to the contact **49** is broken if contact **53** touches either contact **54** or **55**.

The pump **40** is shown in section in more detail in FIGURE 2. It is of the well-known sliding vane type, and consists of a chamber **56** with an inlet **57** and an outlet **58**. A rotor **59** is mounted off centre of the chamber **56** and carries four vanes **60**, which are free to slide radially outwardly under the action of centrifugal force as the rotor **59** rotates, and are free to slide radially inwardly as they contact the upper part of the chamber **56**. Thus, as each pair of vanes **60** moves away from the inlet port **57**, the air which is trapped between them is carried to the outlet **58**, and forced therethrough as the vanes are pushed into the rotor as they contact the upper part of the chamber **56**.

The operation of the apparatus is as follows:

As the continuous filler formed on the band **2** passes under the chamber **6**, air is drawn through it and the band **2** into the chamber **6** and passes through the pipe **7**, due to the suction exerted on this pipe. The air pressure at any instant in the chamber **6** thus depends on the quantity of tobacco in the length of filler beneath the chamber **6**, and thus the pressure in the chamber is a measure of the air permeability of this length of the filler, and thus of the quantity of tobacco in this length. The varying pressure in the chamber **6** is thus a measure of the uniformity of the filler as it passes under the chamber **6**. This pressure is communicated to the bellows **9** by the pipe **8**, and rod **10** moves upwardly when there is a low pressure in the bellows **9**, indicating an excess amount of tobacco beneath the chamber **6**, and downwardly when there is a high pressure in the bellows, indicating too little tobacco under the chamber **6**.

The rate at which tobacco is fed to form the filler is chosen so that the filler contains an excess of tobacco at all points along its length, which excess is to be removed by the trimming device **5**. When the rod **10** moves downwards, as just mentioned, the hydraulic amplifier **11** acts to correspondingly move link **13**, and thus the right-hand end of lever **12** and the trimming discs **5** upwards, so that more tobacco is trimmed from that length of the filler. Thus, variations in uniformity of the filler are detected, and the trimming operation is controlled accordingly to remove, or at least to reduce, these variations. This part

of the operation is as described in detail in Patent No. 3,089,497.

However, there may still be long-term variations in the mean weight of the filler as it leaves the trimming device **5** caused, for example, by changes in the moisture content of the tobacco or some variation in the tobacco itself. Accordingly, the position of the trimming discs **5** relative to the band **2** is additionally varied by the left-hand end of the lever **12** being raised or lowered by rotation of the motor **20** in one direction or the other in dependence on the air pressure in the pipe **41**.

This air pressure is the pressure drop across the tobacco in the tongue **38**, since the garniture tape is in contact with the trough **33** and all the air is forced to flow through the tobacco and escapes to atmosphere from the tongue. The tongue **38** and the adjacent part of the trough **33** constitute wall means which define a passage through which the unwrapped filler passes in the direction of its length, the wall means extending around almost the entire periphery of the filler. The air forced into the tobacco in the tongue **38** escapes to atmosphere around the sides of the tongue and of the compression shoe **37**, but the ease with which the air can escape depends on the quantity of tobacco which is blocking its escape path. As this escape path is of constant maximum volume since the tongue and compression shoe and trough **33** are rigid, a dense length of the filler more effectively blocks this escape path and the pressure in the pipe **41** rises to produce a greater pressure drop across the greater quantity of tobacco compacted into the constant volume. Similarly, a lower pressure is produced in the pipe **41** as a lighter length of filler passes under the tongue. Thus, a varying air pressure is produced in pipe **41**, which is an indication of the variation of mass per unit length of the trimmed filler. The mean value of this pressure is about 24 inches of water. It has been found that a very close correlation obtains between this air pressure and the mass per unit length of the filler. The integrating chamber **45** smooths short-term variations of this air pressure and produces an air pressure which is an indication of the average amount of tobacco in a length of the filler equal to about 25 cigarettes. Any suitable length between say 25 and 50 cigarettes could be chosen.

If the air pressure falls to an extent indicating that the filler is 1% light, diaphragm **47** and contact **49** will move to the left, and the circuit will be made with the contact **50**, causing the motor **20** to rotate and move the trimming discs **5** downwardly. The motor **20** will continue to rotate until the diaphragm **47** senses an air pressure indicating that the filler is now less than 1% light. Similarly, if the filler is more than 1% heavy the contacts **49** and **51** will touch and the motor **20** will rotate in the other direction until the filler is less than 1% heavy. Due to the averaging effect of the chamber **45**, and the inertia of the system, by the time the motor **20** stops rotating, the filler, instead of being just on the limit, either 1% heavy or 1% light, will be just about correct.

However, there are occasions where an exceptionally heavy or light signal may be given and it is not desired to alter the position of the trimming discs **5**, e.g. on starting or stopping the machine. If the signal indicates more than 5% heavy then the contacts **53** and **55** will close and stop rotation of the motor **20**, and if the indication is that the filler is more than 5% light then contacts **53** and **54** will close and again the circuit to the motor **20** will be broken.

As described in Patent No. 3,089,497 the motor **20** could additionally vary the speed of operation of the hopper (not shown) to vary the rate of feed of tobacco to form the filler, or the hopper could be so controlled instead of controlling the position of the trimming discs **5**.

In FIGURE 4 there is illustrated a modification in which the pipe **41** communicates with the compression shoe **37**, instead of with the tongue **38**. In this case, a gap shown at **61** is provided between the shoe and the

tongue for air to escape from the tobacco, otherwise the construction and operation is as previously described. In this case the mean value of the air pressure in pipe **41** is 16–17 inches of water.

FIGURES 8, 9 and 10 show a modified detecting apparatus **152** to replace the chambers **42** and **43**. In this arrangement there is no apparatus performing a function equivalent to that of the chamber **43**. In FIGURE 8 an electrical circuit additional to the circuit **52** is indicated schematically as **153**, and the details of the circuit being shown in FIGURE 10.

Referring to FIGURE 8, the pipe **44** from the integrating chamber **45** supplies air pressure to two pipes **154** and **155** which communicate the air pressure respectively to two resilient capsules **156** and **157** which are secured to the top plate **158** of the housing of the apparatus. The lower faces of the capsules **156** and **157** carry respectively electrical contacts **159** and **160** which are associated respectively with stationary contacts **161** and **162** carried by a plate **163** which is adjustable in the vertical direction to vary the distance between the contacts on the capsules and the stationary contacts. To provide this vertical adjustment the following arrangement is adopted (see also FIGURE 9). The ends of the plate **163** support two circular section pillars **164** and **165** which extend through the top plate **158** and have their upper ends connected by a bridge piece **166**. A threaded shaft **167** is mounted in the bridge piece for rotation relative thereto, but not for relative axial movement. The shaft **167** carries a knurled knob **168** and a graduated scale **169**. At is lower end the shaft **167** is screwed into a nut **170** secured into the top plate **158**. Rotation of the knob **168** thus raises or lowers the bridge piece **166** and the pillars **164** and **165**, and with them the plate **163** and the contacts **161** and **162**. Referring now to FIGURE 9, the contacts **161** and **162** are in the form of cantilever spring blades which are mounted at one end in insulating blocks **171** and **172** respectively. At their other ends the spring contact blades **161** and **162** are arranged to be individually adjustable to vary the gap between each blade and the associated contact on a capsule. At the left-hand end of the plate **163** two blocks **173** and **174** are mounted and carry respectively eccentrics **175** and **176**. Thus the free end of contact blade **162** is held down under the eccentric **176**, rotation of which varies the gap between this blade and the contact **160**. Similarly with the contact blade **161**, eccentric **175** and contact **161**. Thus it can be arranged that the contact **160** touches the blade **162** at a desired increase in air pressure in the capsules over the pressure at which contact **159** touches blade **161**. Rotation of knurled knob **168** sets the air pressure corresponding to tobacco mass per unit length within the correct range. Electrical connections **177** and **178** lead respectively from contact blades **161** and **162** to the box circuit **153** and an electrical connection **179** (FIGURE 8) leads from the contacts **159** and **160** to the circuit in the box **153**.

The apparatus **152** is adjusted so that when an air pressure is present in the capsules **156** and **157** indicating that too little tobacco is passing through the tongue **38** (or the shoe **37**) all the contacts are open, when an air pressure indicating that the correct amount of tobacco is passing (say within 1% heavy and 1% light of the desired mean weight) contacts **159** and **161** are made, and that when too much tobacco is passing the contacts **160** and **162** additionally are made. Referring now to FIGURE 8, the following arrangement is adopted to maintain the plate **163** accurately in the horizontal position at all levels of adjustment. The plate **163** is rigidly mounted on the upper end of a rigid tube **179** which extends between three pairs of ball races **180** (only two pairs of which are shown). Each pair of bearings is carried in a mounting **181** secured to the sides of the apparatus **152**. The circuit shown in FIGURE 10 is a relay switch utilising two transistors, and is shown connected to the contacts **159**

and 161, and 160 and 162. The circuit contains three contacts 149, 150 and 151 which are connected in the circuit 52 in a similar manner to the contacts 49, 50 and 51 of the previously described apparatus.

The power connections of the circuit 182 and 183 are connected to an alternating current supply of 300 volts and, by means of the rectifier 184 and filter network 185, a direct current supply of approximately 28 volts is produced. Current is fed via the bases of the two transistors 186 and 187 through a network (symmetrical when contacts 161 and 159 are closed and contacts 160 and 162 are open) to balance the energising coils 188 and 189 of a high speed relay, indicated in dashed lines at 190, of the Carpenter type. The contacts 149, 150 and 151 are part of the relay 190 and are open in this balanced condition. When contacts 160 and 162 are closed an additional resistor 191 is placed in parallel with resistor 192 and thus more current flows in the transistor 187 and the relay is unbalanced, and the contacts 149 and 151 are made. With both sets of contacts 159, 161 and 160, 162 open the relay 190 is unbalanced in the opposite sense, as no current flows in the transistor 187, and contacts 150 and 149 are made. Opening and closing of the contacts 149 and 150 and 151 controls the circuit 52 in the same manner as contacts 49, 50 and 51 of the previous construction. With this modification the relay switch 300 of circuit 52 is omitted.

The modified apparatus operates as follows. The eccentrics 175 and 176 are adjusted to give the appropriate air pressure differential between the pressure which causes closing of the contacts 159, 161 and the pressure which causes closing of the contacts 160, 162 corresponding to the correct range of mass per unit length of the tobacco filler (say between plus and minus 1% of the desired mean weight). The knurled knob 168 is then adjusted to set the air pressure intermediate that at which the contacts 159, 161 and 160, 162 are made to correspond to the desired mean weight for the tobacco filler. Then, in operation, if the filler is more than 1% light contacts 159, 161, 160 and 162 are all open, the contacts 149 and 150 are made, and the motor 20 rotates to move the trimming device 5 to remove less tobacco from the filler. When the tobacco filler is in the correct weight range the capsule 156 moves contact 159 to touch contact 161 and the contacts 149, 150 and 151 are all open, and the motor 20 is stationary, and the trimming device 5 remains at the same level. If the filler becomes more than 1% heavy the capsule 157 moves the contact 160 to touch contact 162, and the contact 149 touches contact 151, and the motor 20 rotates to move the trimming device to remove more tobacco from the filler.

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

1. A continuous rod cigarette-making machine having means to form an elongated continuous tobacco stream, a conveyor to convey the tobacco stream lengthwise, and side walls to form with the conveyor a trough having an open side; said machine comprising a stationary compression member in the open side of the trough to form therewith a confining passage of fixed configuration through which the conveyor conveys the tobacco stream, means to pass air at more than atmospheric pressure through the tobacco confined at any instant in the passage, means to detect variations in the effect on the air of variations in air permeability of the confined tobacco due to variations in the quantity of tobacco from place to place along the filler and adjustable means responsive to said detecting means for controlling the size of the section of the tobacco stream in dependence on said detected variations.

2. A continuous rod cigarette-making machine having means to form a continuous tobacco stream, a garniture tape to draw a continuous paper wrapper into the machine, means to fold the continuous paper wrapper around the continuous tobacco stream to form a continuous cigarette rod, a trough through which the garniture tape and the paper wrapper pass while the paper wrapper is conveying the continuous tobacco stream, and a stationary compression member cooperating with the trough to form a confining passage of fixed configuration through which the paper wrapper and tobacco stream are drawn before the wrapper is wrapped around the tobacco stream to form the continuous cigarette rod; said machine comprising means to pass air at more than atmospheric pressure through the compression member and the tobacco confined at any instant in the confining passage, means to detect variations in the effect on the air of variations in air permeability of the confined tobaccos due to variations in the quantity of tobacco from place to place along the tobacco stream and adjustable means responsive to said detecting means for controlling the size of the section of the tobacco stream in dependence on said detected variations.

3. A continuous rod cigarette-making machine as claimed in claim 2 and having a tongue and wherein the said compression member is a compression shoe which has its downstream edge spaced from the upstream edge of the tongue for air to escape from the tobacco.

4. A continuous rod cigarette-making machine as claimed in claim 2 and wherein the said compression member is a tongue.

5. A continuous rod cigarette-making machine as claimed in claim 2 comprising a trimming device to remove surplus tobacco from the tobacco stream upstream of the compression member, a reversible electric motor operable to cause relative movement between the trimming device and the conveyor towards and away from each other to vary the amount of tobacco removed from the tobacco stream, and wherein the means to detect variations in the effect on the air is a pressure-responsive device responsive to the pressure drop of the air in passing through the confined tobacco, and comprising an electrical power supply circuit for the motor containing switches selectively operable to cause the motor to rotate in either direction, and a first set of electrical contacts operable by the pressure-responsive device to operate the switches to cause the motor to rotate in the appropriate direction to cause said relative movement to adjust the amount of tobacco remaining in the tobacco stream arriving at the confining passage in the sense to maintain the pressure drop across the stream within a predetermined range.

6. A continuous rod cigarette-making machine as claimed in claim 5 wherein the pressure-responsive means comprises first and second pressure-sensitive capsules, and comprising a second set of electrical contacts comprising first and second pairs of electrical contacts, one contact of each pair being carried by the first and second capsules respectively, insulating mounting means carrying the other contact of each pair, the gap between the first pair of contacts being such that the contacts are made at the lower end of the predetermined range, and the gap between the second pair of contacts being such that the contacts are made at the upper end of the predetermined range, and an additional electrical circuit operable when the first and second pairs of contacts are open to operate the first electrical circuit to cause the motor to rotate to increase the amount of tobacco left in the tobacco stream downstream of the trimming device, and operable when the first pair of contacts only is made to stop the motor, and operable when both the first and second pairs of contacts are made to operate the first electrical circuit to cause the motor to rotate to decrease the amount of tobacco left in the tobacco stream downstream of the trimming device.

7. A continuous rod cigarette-making machine as claimed in claim 6 wherein the said other contact of each of the first and second pairs of contacts is a spring blade which is carried at one end by the insulating mounting means, and comprising two eccentrics mounted for rotation in the insulating mounting means and each supporting the other end of one of the spring blades, whereby

rotation of the eccentrics moves the spring blades towards and away from the contacts carried by the capsules to vary the predetermined range.

8. A continuous rod cigarette-making machine as claimed in claim 7 and further comprising structure movable with respect to the capsules and carrying the insulating mounting means whereby the spring blades are simultaneously bodily movable with respect to the contacts carried by the capsules to move the predetermined range.

References Cited by the Examiner

UNITED STATES PATENTS

1,977,998	10/1934	Podmore	131—61
2,465,818	3/1949	Richardson	131—84 X
2,503,082	4/1950	Tuttle	200—27 X
2,516,932	8/1950	Wainwright.	
2,540,767	2/1951	Trabbert	230—153 X
2,617,426	11/1952	Patterson	131—84 X
2,843,882	7/1958	Lewis et al.	131—84
2,938,521	5/1960	Lanore	131—21
2,952,262	9/1960	Pocock et al.	131—21
3,089,497	5/1963	Molins et al.	131—21

FOREIGN PATENTS

157,873	7/1954	Australia.
505,930	5/1939	Great Britain.
491,590	3/1954	Italy.

SAMUEL KOREN, *Primary Examiner.*

JOSEPH S. REICH, *Examiner.*