Oct. 8, 1968 B. SCHUBERT 3,404,689

APPARATUS FOR APPLYING UNITING BAND MATERIAL TO GROUPS OF ROD-SHAPED ARTICLES

Filed Dec. 15, 1965 2 Sheets-Sheet 1

Fig. 1

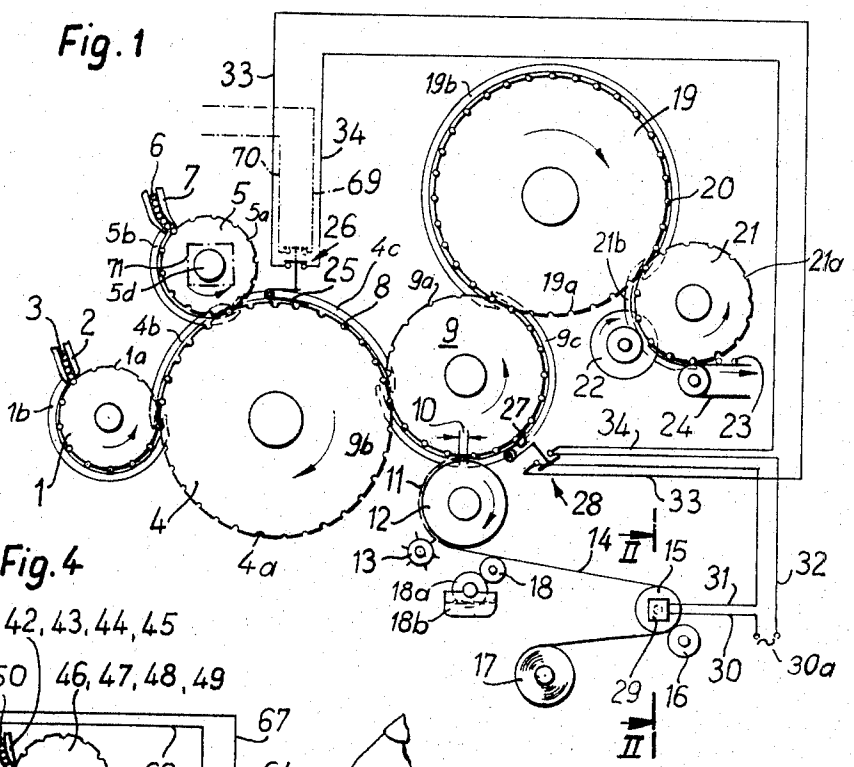
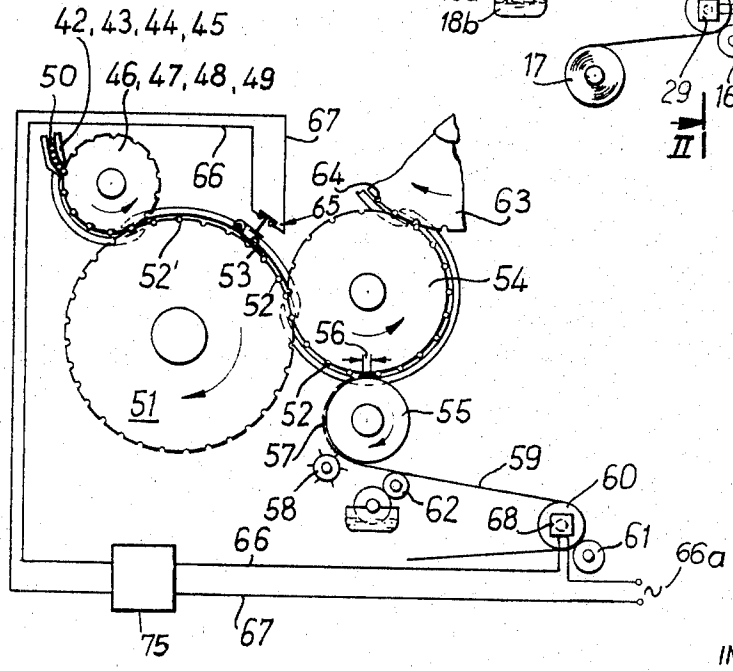


Fig. 4



INVENTOR.
Bernhard Schubert

BY

Michael J. Striker
Atty

Oct. 8, 1968 B. SCHUBERT 3,404,689

APPARATUS FOR APPLYING UNITING BAND MATERIAL TO GROUPS OF ROD-SHAPED ARTICLES

Filed Dec. 15, 1965 2 Sheets-Sheet 2

Fig.3

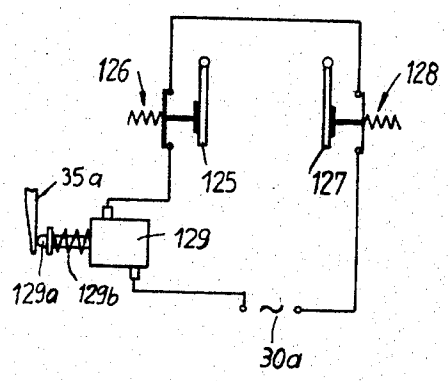
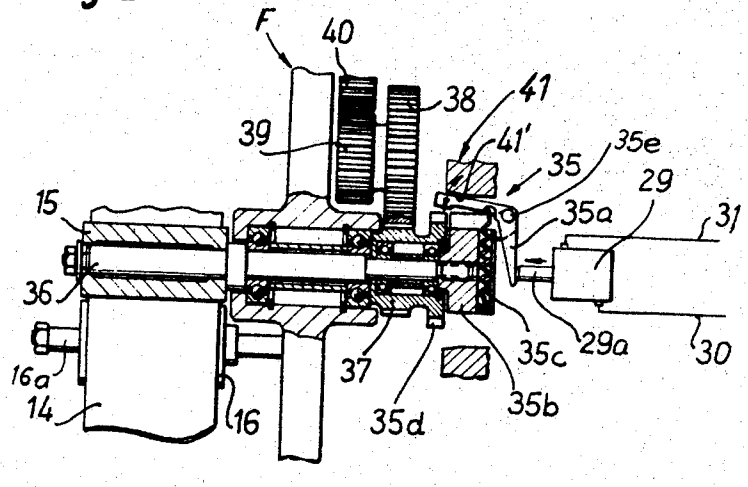


Fig.2



INVENTOR.
Bernhard Schubert

BY Michael J. Striker
Atty

United States Patent Office 3,404,689 Patented Oct. 8, 1968

3,404,689

APPARATUS FOR APPLYING UNITING BAND MATERIAL TO GROUPS OF ROD-SHAPED ARTICLES

Bernhard Schubert, Hamburg-Lohbrugge, Germany, assignor to Hauni-Werke Korber & Co., K.G., Hamburg-Bergedorf, Germany

Filed Dec. 15, 1965, Ser. No. 514,019
Claims priority, application Great Britain, Dec. 17, 1964, 51,466/64
14 Claims. (Cl. 131—21)

ABSTRACT OF THE DISCLOSURE

Apparatus for joining tobacco rods with filter rod sections comprises a conveyor which advances groups of tobacco rods and filter rod sections past a transfer station where the groups are provided with patches of adhesive-coated uniting band material fed by a rotary advancing device. The controls which regulate the feed of band material include a drive unit, a braking unit, a clutch which can connect the advancing device with the drive unit or with the braking unit, a detector which scans the conveyor for the presence or absence of groups, and an actuating device which connects the advancing device with the braking unit when the detector detects the absence of groups on the conveyor.

The present invention relates to apparatus for applying uniting band material to groups of rod-shaped articles. More particularly, the invention relates to apparatus for applying patches of adhesive-coated uniting band material to groups of coaxial articles which may include two or more filter plugs or one or more filter plugs and one or more tobacco rods. For example, the apparatus of my invention may be resorted to for joining filter plugs of double unit length with pairs of coaxial cigarette rods of unit length to form filter cigarettes or double unit length, or for joining two or more filter plugs into a multiplex filter plug.

In filter cigarette machines, cigarette rods and filter plugs are joined in rapid sequence by means of adhesive-coated patches which are obtained on subdivision of a continuously advancing uniting band. The band is being withdrawn from a bobbin and one of its sides is coated with adhesive paste as it advances toward a transfer station where the patches are applied to consecutive groups of aligned cigarettes and filter plugs. Prior to reaching the transfer station, the band is subdivided into patches of requisite size, and such patches are applied to consecutive groups by means of a rotary suction drum in a manner well known from the art of filter cigarette making. The feed for the uniting band must be interrupted as soon as the feed of grouped rod-shaped articles is interrupted for whatever reason, e.g., due to malfunction of the conveyor, because the patches might contaminate the machine or might cause a complete breakdown if they are permitted to enter between certain moving parts.

It is already known to advance the uniting band by passing it between two rollers one of which is driven to draw the band off the bobbin. In the event of an interruption in the feed of cigarette rods and/or filter plugs, one of the rollers is moved away from the other roller to thereby interrupt the feed of band material. At the same time, the band is disengaged from the paster and is gripped by a suitable braking device to positively prevent further advance of the band toward the transfer station. Reference may be had, for example, to U.S. Patent No. 3,081,778. However, it was found that the just outlined safety features cannot insure sufficiently rapid interruption in the feed of uniting band, mainly because the

aforementioned suction drum continues to rotate and tends to entrain the uniting band after the actual drive for the band is disengaged therefrom. In accordance with a further proposal, the bearing for the bobbin on which the uniting band is stored supports the bobbin with considerable friction so that the band is maintained under tension and is more likely to be arrested without undue delay. A drawback of such constructions is that the band is likely to tear because its material is rather weak.

Accordingly, it is an important object of the present invention to provide an apparatus for controlling the feed of uniting band material to a transfer station where patches of such band material are being applied to groups of travelling axially aligned rod-shaped articles and to provide the apparatus with means adapted to regulate the feed of uniting band material in such a way that delays in the interruption of feed will develop only when such delays are actually desired.

Another object of the invention is to construct the apparatus in such a way that the feed of uniting band material may be interrupted with a minimum of delay and without tearing or otherwise damaging the band.

A further object of the instant invention is to provide an apparatus for joining groups of coaxial rod-shaped articles by patches of adhesive-coated uniting band material and to construct the apparatus in such a way that the feed of band material may be controlled by two or more factors and that interruptions in the feed of band material may be accompanied by automatic interruption in the feed of groups.

An additional object of the invention is to provide a novel clutch which controls the operation of advancing means for uniting band material.

Briefly stated, one feature of my present invention resides in the provision of an apparatus joining coaxial rod-shaped articles by means of adhesive-coated uniting band material. The apparatus comprises means for feeding groups of coaxial articles sideways along a predetermined path and past a transfer station, means for feeding band material to the transfer station, means for subdividing the moving material into patches and for applying consecutive patches to successive groups at the transfer station, means for scanning the path for the presence and absence of groups, means for interrupting the feed of band material in response to detection of absence of such groups, and means for applying a braking force to the advancing mechanism for the band material simultaneously with uncoupling of the advancing mechanism from its drive. If the path is scanned at a single point, such point may be located upstream or downstream of the transfer station, preferably downstream. However, it is also possible to scan the path both upstream and downstream of the transfer station and to restart the feed for uniting band material only when the groups are detected at both scanning points.

In accordance with another feature of the invention, the feed of one or more components of each group may be interrupted simultaneously with an interruption in the feed of band material to prevent waste. For example, the components of each group may include one or more tobacco rods and one or more filter plugs or two or more filter plugs, depending upon whether the apparatus is used in the production of filter cigarettes or composite (multiplex) filter plugs.

The novel features which are considered as characteristic of the invention are set forth in particular in the appended claims. The improved apparatus itself, however, both as to its construction and its mode of operation, together with additional features and advantages thereof, will be best understood upon perusal of the following detailed description of certain specific embodi-

ments with reference to the accompanying drawings, in which:

FIG. 1 is a diagrammatic side elevational view of a filter cigarette machine which embodies one form of the improved apparatus;

FIG. 2 is an enlarged fragmentary section substantially as seen in the direction of arrows from the line II—II of FIG. 1 and illustrates a clutch which is used to control the advancing means for uniting band material;

FIG. 3 is a circuit diagram showing a portion of a modified apparatus; and

FIG. 4 is a fragmentary side elevational view of a filter machine which embodies a different apparatus.

Referring first to FIGS. 1 and 2, there is shown a filter cigarette machine wherein two types of rod-shaped articles, namely, pairs of coaxial cigarette rods **3** of unit length and filter plugs **6** of double unit length, are joined by an apparatus which wraps patches **11** of adhesive-coated uniting band material **14** around the filter plugs **6** and around the adjoining end portions of the cigarette rods **3**. The apparatus comprises a conveyor including two cooperating rotary drums **4** and **9** which advance groups **8** (each composed of two coaxial cigarette rods **3** and a filter plug **6** therebetween) toward, past and beyond a transfer station **10** which is adjacent to a portion of the second drum **9**. The feed for supplying pairs of coaxial but spaced cigarette rods **3** into consecutive pockets or holders **4***a* of the drum **4** comprises an inclined chute **2** and a rotary transfer drum **1**. The drum **1** is also provided with axially parallel pockets or holders **1***a* and is partially surrounded by one or more arcuate shields **1***b* which retain the cigarette rods **3** during travel to the point of transfer between the drums **1** and **4**. Similar shields **4***b* and **9***b* surround portions of the drums **4** and **9**. The feed for filter plugs **6** comprises an inclined chute **7** and a rotary drum **5** having axially parallel pockets **5***a* and cooperating with arcuate retaining shields **5***b*. The arrangement is such that the pockets **5***a* discharge filter plugs **6** into gaps between pairs of cigarette rods **3** in the pockets **4***a* of the drum **4**. The thus obtained groups **8** are then conveyed between inclined condensing or shifting cams **4***c* which cause the cigarette rods **3** to move axially toward the adjoining ends of the aligned filter plugs. The groups **8** are then transferred into consecutive pockets **9***a* of the drum **9** and travel along the shields **9***b* toward and past the transfer station **10**.

The aforementioned apparatus further comprises a bobbin **17** or a similar source of uniting band material, advancing means for withdrawing such material from the bobbin **17**, and a novel control assembly for regulating the feed of band material to the transfer station **10**. The advancing means includes a driven advancing roller **15** and an idler roller **16**. The web **14** of uniting band material is guided through the gap between the rollers **15**, **16** and is being paid out by the bobbin **17** as long as the roller **15** rotates. The underside of the web **14** is then guided along a paster roller **18** of conventional design which coats the web with a film of adhesive. The roller **18** receives adhesive from an intermediate roller **18***a* which dips into a supply of adhesive contained in a paste pot **18***b*. The thus coated web is then guided around a revolving suction drum **12** which serves as a means for applying patches **11** to consecutive groups **8**. The patches **11** are formed by a revolving knife **13** which cooperates with the suction drum **12** and severs the web **14** at regular intervals. The rollers **15**, **16** move the web **14** at a speed which is somewhat less than the peripheral speed of the suction drum **12** so that each freshly severed patch **11** moves away from the leading end of the remainder of the web **14** to insure unobstructed transfer to the respective group **8**.

Each group **8** which has advanced past the transfer station **10** carries a patch **11**, and such patches may extend substantially tangentially of the respective filter plugs **6**. The groups are then advanced along arcuate shields **9***c* and are transferred into consecutive pockets **19***a* of a rotary wrapping drum **19** surrounded by a shield **19***b*. While travelling with the drum **19**, the patches **11** are convoluted around the respective filter plugs **6** and around the adjoining end portions of the cigarette rods **3** to be transformed into tubes which serve to connect the cigarette rods with the respective filter plugs and to transform each group **8** into a filter cigarette **20** of double unit length. Such cigarettes **20** are thereupon transferred into consecutive pockets **21***a* of a so-called cutting drum **21** which is surrounded by shields **21***b* and advances the cigarettes past a rapidly revolving disk-shaped cutter **22** so that the cigarettes **20** are severed in planes extending midway across the convoluted patches **11** and yield pairs of filter cigarettes **23** of double unit length. The cigarettes **23** are deposited onto the upper stringer of a transporting belt **24** which advances them to storage, to a station where the cigarettes are transferred into trays, or directly to a packing machine.

With the exception of the advancing means **15**, **16** and of the aforementioned control assembly, the heretofore described components of the filter cigarette machine are well known in the art and by themselves form no part of my present invention.

The invention resides mainly in the provision of the control assembly and in the manner in which the control assembly may regulate the feed of uniting band material and, if desired, the feed of cigarette rods **3** and/or filter plugs **6**. This control assembly includes a drive unit for the roller **15**, a braking unit **41**, a clutch **35** which can couple the roller **15** with the drive unit or with the braking unit (but not with both units at the same time), a detector assembly including two detecting or scanning members **25**, **27** and an actuating assembly including two electric switches **26**, **28** and a solenoid **29**. The actuating assembly serves to uncouple the clutch **35** from the drive unit or from the braking unit, depending upon whether or not one of the scanning members **25**, **27** has detected the presence or absence of assemblies **8** on the conveyor which includes the drums **4** and **9**. The scanning member **25** constitutes a trip for the switch **25** which is normally open, and the scanning member **27** constitutes a trip for the normally open switch **28**. These switches are connected in parallel and their circuit further includes a suitable source **30***a* of electrical energy. A first conductor **30** connects one pole of the source **30***a* with the solenoid **29**; a second conductor **31** connects the solenoid with one contact of the switch **28**; a third conductor **33** connects this one contact of the switch **28** with one contact of the switch **26**; a fourth conductor **34** connects the other contact of the switch **26** with the other contact of the switch **28**; and a fifth conductor **32** connects the other contact of the switch **28** with the other pole of the source **30***a*. The trip **25** is adjacent to the periphery of the drum **4**, i.e., it is located upstream of the transfer station **10** and is arranged to scan the drum **4** for the presence or absence of entire groups **8** or for the presence or absence of one or two rod-shaped components of such groups. In other words, the trip **25** may detect that an entire group **8** is missing, that a pocket **4***a* contains only one or two cigarette rods **3**, or that a pocket **4***a* contains only a filter plug **6** or a filter plug and a single cigarette rod. The length of the trips **25** and **27** is such that each thereof can overlie two adjacent pockets **4***a* or **9***a* at a time. In FIG. 1 the trip **25** is shown in its lower end position because it overlies two empty pockets **4***a*. Therefore, the switch **26** is closed and the solenoid **29** is energized. The switch **28** is open because the corresponding trip **27** overlies two filled pockets **9***a*; nevertheless, the solenoid **29** remains energized because the switches **26** and **28** are connected in parallel. If the trip **25** and switch **26** were installed in the zone between the transfer drums **1** and **5**, the trip **25** could only detect the presence or absence of one or both cigarette rods **3**. When the filter cigarette

machine operates properly, the trips **25** and **27** are lifted by the groups **8** which advance therebelow so that the circuit of the switches **26, 28** is open and the solenoid **29** is deenergized. The trip **27** and the switch **28** are located downstream of the transfer station so that the trip **27** can detect the presence or absence of groups **8** which are already provided with patches **11.**

The solenoid **29** comprises a reciprocable armature **29***a* (see FIG. 2) which can move the dog **35***a* of the clutch **35** to a first end position. The dog **35***a* is biased by a spring **35***c* which tends to move it to a second end position. When the solenoid **29** is energized, it expels the armature **29***a* (i.e., the armature then moves in a direction to the left, as viewed in FIG. 2), so that the dog **35***a* is rocked against the bias of the spring **35***c* and is disengaged from the teeth of a clutch element **35***d*. One arm of the dog **35***a* then bears against an internal braking surface **41'** provided on the stationary braking unit **41.** As shown, the dog **35***a* resembles a two-armed lever and is mounted on a pivot pin **35***e* carried by a clutch element **35***b* affixed to the shaft **36** of the driven advancing roller **15.** The clutch element **35***d* is rigid or integral with a pinion **37** which forms part of the drive unit for the roller **15,** this drive unit further including a gear **38** which meshes with the pinion **37,** a pinion **39** which is coaxially secured to the gear **38,** and a further gear **40** which drives the pinion **39.** The drive unit, the shaft **36** of the roller **15,** and the shaft **16***a* of the idler roller **16** are mounted on a plate-like frame member F which preferably supports the entire filter cigarette machine. The gear **40** is driven by a suitable transmission from the main drive shaft of the machine or directly by an electric motor, not shown. The pinion **37** and the clutch element **35***d* are rotatable with reference to the roller shaft **36.**

The operation of the filter cigarette machine is as follows:

If there is an interruption in the feed of cigarette rods **3** and/or filter plugs **6,** the trip **25** descends to the position of FIG. 1 as soon as it is bypassed by the last complete group **8** whereby the switch **26** closes and the solenoid **29** is energized. The armature **29***a* is expelled and rocks the dog **35***a* to the position of FIG. 2 whereby the dog disengages the clutch element **35***b* from the clutch element **35***d* (i.e., it disconnects the roller **15** from the drive unit) and simultaneously couples the roller **15** with the braking unit **41** by bearing against the stationary braking surface **41'.** This brings the roller **15** to an immediate halt, together with the web **14** so that the suction drum **12** cannot apply patches **11** to the groups **8.**

The suction prevailing in the interior of the drum **12** is selected in such a way that the leading end of the web **14** adheres to the periphery of the drum but cannot tear if the drum **12** continues to rotate after the roller **15** is brought to a standstill. In other words, and if the suction drum **12** continues to rotate after the roller **15** is arrested, the slippage between the web **14** and the drum **12** simply increases but the web remains intact. The magnitude of the force produced by the drum **12** which tends to move the web **14** lengthwise may be regulated by changing the area of contact between the periphery of this drum and the web.

The apparatus of my invention may be further provided with a device which lifts the web **14** away from the paster roller **18** as soon as the solenoid **29** is energized. For example, such a device may comprise a lifting roller which is mounted in the zone between the rollers **15** and **18** and moves upwardly as soon as the circuit of the solenoid **29** is completed, either by receiving motion directly from the armature **29***a* or from the armature of a second solenoid which is connected in series with the solenoid **29.** The web **14** remains disengaged from the roller **18** until the dog **35***a* reestablishes the driving connection between the pinion **37** and the shaft **36.**

If the disturbance in the feed of cigarette rods **3** and/or filter plugs **6** is eliminated and a freshly assembled group **8** again lifts the trip **25,** the latter opens the switch **26** so that the solenoid **29** is deenergized and retracts the armature **29***a* whereby the spring **35***c* is free to rock the dog **35***a* back into engagement with the teeth of the clutch element **35***d* to couple the drive unit with the advancing roller **15.** Of course, such deenergization of the solenoid **29** can take place only if the switch **28** is also open. However, the switch **28** can open only after a fresh row of groups reaches the second trip **27** so that the solenoid **29** remains in energized condition despite the fact that the switch **26** might be open due to the presence of groups **8** in the space below the trip **25.** In other words, the roller **15** will begin to feed the web **14** only when a continuous row of groups **8** extends all the way from the trip **25** to the trip **27** so that these trips open the switches **26** and **28.**

As stated before, the trips **25** and **27** may be constructed and configurated in such a way that each thereof can detect the presence of one, two or all three rod-shaped components of a group **8.** For example, each of these trips may comprise three fingers each of which can scan the drum **4** or **9** for the presence of a single cigarette or filter plug. Each finger can by itself open or close the corresponding switch **26** or **28.**

While it would be possible to omit one of the trips **25, 27,** the actuating assembly which includes two trips is preferred for the following reasons. If the apparatus of FIG. 1 were without the trip **25,** the trip **27** could detect the absence of groups **8** only at a time when at least one patch **11** was already transferred to the drum **9** without meeting a group of cigarette rods and filter plugs. In other words, such patch or patches could contaminate the machine. In the absence of the trip **27,** the roller **15** would begin to feed the web **14** as soon as the trip **25** would detect a group **8** whereby the suction drum **12** would again transfer patches **11** to a series of empty pockets **9***a* before the patches would begin to meet properly assembled groups of filter plugs and cigarette rods. In other words, by using two trips which are respectively disposed upstream and downstream of the transfer station **10,** I insure that the patches **11** cannot be applied to the drum **9.** However, it is equally within the purview of my invention to omit one of the trips **25, 27** and to control the feed of uniting band material by a single detecting member which may be installed upstream or downstream of the transfer station. If the trip **25** is used alone, the circuit of the solenoid **29** preferably includes a suitable time-lag relay which delays the coupling of the shaft **36** with the pinion **37** for an interval of time which suffices to insure that the foremost group **8** at least reaches the transfer station **10** when the drum **12** begins to apply patches **11.**

It is often desirable to interrupt the feed of filter plugs **6** and/or cigarette rods **3** simultaneously with an interruption in the feed of uniting band material. For example, the filter cigarette machine of FIG. 1 may be provided with a clutch which disengages the transfer roller **5** from its drive simultaneously with energization of the solenoid **29** so that the operator may eliminate a disturbance in the feed of filter plugs **6.** In the absence of such a clutch, all of the filter plugs **6** which would be fed subsequent to a disturbance in the feed of cigarette rods **3** would go to waste and could eventually clog up the machine. As indicated in FIG. 1 by phantom lines, the switch **26** may constitute a double-pole switch which is connected with conductors **69, 70** forming part of an actuating assembly for a clutch serving to couple the shaft **5***d* of the transfer drum **5** with a drive unit or with a braking unit. FIG. 1 merely indicates a solenoid **71** which may be energized when the switch **26** is allowed to close in response to detection of the absence of a group **8** or of cigarette rods **3** so as to effect an immediate braking action upon the shaft **5** and to prevent further feed of filter plugs **6.**

FIG. 3 illustrates a modified actuating device for the clutch **35.** This actuating device comprises a solenoid **129** having a reciprocable armature **129***a,* and two electric switches **126, 128** which are connected in series. These

switches are normally biased to closed positions but may be opened by two trips **125**, **127** which correspond to the trips **25**, **27**. The solenoid **129** is normally energized and then retracts the armature **129***a* so that the dog **35***a* of the clutch **35** can couple the drive unit with the roller **15**. When one of the trips **125**, **127** detects the absence of a group **8**, it opens the respective switch **126** or **128** so that the solenoid is deenergized whereby a spring **129***b* expels the armature **129***a* and the latter causes the dog **35***a* to couple the roller **15** with the braking unit **41**.

Referring finally to FIG. 4, there is shown a machine for the production of so-called multiplex filters, i.e., for the production of composite filters which consist of two or more different filter materials. This machine again comprises a conveyor including two cooperating drums **51**, **54** which transport groups **52** of coaxial filter rod sections **50** past a transfer station **56** which is adjacent to the drum **54**. The pockets of the drum **51** receive such groups from a feed which includes four coaxial transfer drums **46**, **47**, **48**, **49** which respectively cooperate with chutes **42**, **43**, **44** and **45**. Each chute supplies to the respective transfer drum a different filter plug **50** of unit length or multiple unit length.

The width of the web **59** is such that patches **57** of this web may be convoluted around all of the filter plugs **50** which form a group **52**. The groups **52** which have advanced past the transfer station **56** and are provided with patches **57** are then transferred into the pockets of a wrapping drum **63** which completes the wrapping of patches around the respective groups **52** and transforms each such group into a multiplex filter rod **64**.

The web **59** is being withdrawn from a suitable bobbin (not shown) by means of an advancing unit including a driven roller **60** and an idler roller **61**. The underside of the web **59** is coated with adhesive by a paster roller **62** and the web is then guided around a suction drum **55** which cooperates with a revolving knife **58** to form the patches **57**.

The advancing roller **60** may be coupled with a drive unit or with a braking unit in the same way as shown in FIG. 2. FIG. 4 merely shows the actuating device and the detector which latter includes a single trip **53** adjacent to the drum **51**, i.e., upstream of the transfer station **56**. This trip **53** controls an electric switch **65** which forms part of the actuating device and is connected in circuit with a solenoid **68** by means of conductors **66**, **67**. The circuit further includes a source **66***a* of electrical energy. The wrapping drum **63** delivers the filter rods **64** to a cutting drum, to storage or directly to a filter cigarette machine wherein the rods **64** may be severed to yield filter plugs or desired length.

If the trip **53** detects the absence of a single group **52** or of two or more groups, it moves to the lower end position shown in FIG. 4 and causes the switch **65** to close so as to energize the solenoid **68** whereby the armature of the solenoid causes the clutch (not shown) to couple the roller **60** with the braking unit. The circuit of the solenoid **68** includes a suitable time-lag relay **75** which serves to delay the energization of the solenoid for an interval of time which suffices to insure that all of the groups which happen to be located between the trip **53** and the suction drum **55** will advance beyond the transfer station **56** before the feed of the web **59** is interrupted. The relay **75** further insures that, when the trip **53** is lifted in response to detection of a fresh group **52'**, the solenoid **68** is de-energized with such a delay that the group **52'** can reach the transfer station **56** at the time when the suction drum **55** transfers the foremost patch **57**. In other words, the function of the relay **75** is to insure that the suction drum **55** will transfer patches **57** only and alone at such times when the groups **52** actually travel past the transfer station **56**.

A very important feature of my improved apparatus is believed to reside in that the web **14** or **59** need not be directly subjected to the action of a braking device. Thus, instead of directly braking the web, I prefer to apply a braking action to the advancing roller **15** or **60**. This roller need not be swung to and from the idler roller **16** or **61** so that the feed for the uniting band material is of rather simple and rugged design. The braking action upon the roller **15** or **60** can begin simultaneously with an interruption of driving connection between the driving unit and the roller **15** or **60** so that full braking action can be applied practically without any delay. It was found that such application of the braking force results in more rapid interruption in the feed of uniting band material. The clutch **35** is a very simple device which can be readily installed in presently known filter machines or filter cigarette machines without necessitating any appreciable alterations in the mounting and/or operation of the remaining parts.

While it is possible to connect the clutch **35** and the detecting members **25**, **27** or **53** by means of more complicated (mechanical or pneumatic) actuating assemblies, an electrical actuating assembly which includes the solenoid **29**, **129** or **68** has been found to be particularly suited because it can transmit signals or impulses without delay and is much less prone to malfunction than a mechanical or pneumatic device.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features which fairly constitute essential characteristics of the generic and specific aspects of my contribution to the art and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be protected by Letters Patent is:

1. An apparatus for joining coaxial rod-shaped articles by uniting band material, particularly for joining tobacco rods and/or filter plugs, comprising conveyor means for feeding groups of rod-shaped articles past a transfer station; a source of uniting band material; rotary advancing means for feeding such material from said source to said transfer station; and control means for regulating the feed of band material including a drive unit and a braking unit for said advancing means, clutch means for coupling said advancing means with one of said units at a time, detector means for scanning said conveyor means for the presence and absence of groups, and actuating means connecting said detector means with said clutch means so as to couple said advancing means with said braking unit in response to the absence of groups on said conveyor means.

2. An apparatus as set forth in claim **1**, wherein said clutch means comprises a dog movable by said actuating means between first and second positions in which said advancing means is respectively coupled with said drive unit and said braking unit.

3. An apparatus as set forth in claim **2**, wherein said braking unit comprises a fixed braking surface and wherein said dog engages said braking surface in the respective position thereof to thereby hold said advancing means against rotation.

4. An apparatus as set forth in claim **1**, wherein said actuating means comprises a solenoid having a movable armature which controls said clutch means.

5. An apparatus as set forth in claim **1**, wherein said detector means comprises a detecting member which is located upstream of said transfer station.

6. An apparatus as set forth in claim **1**, wherein said detector means comprises a detecting member which is located downstream of said transfer station.

7. An apparatus as set forth in claim **1**, wherein said detector means comprises two detecting members which are respectively located upstream and downstream of said transfer station.

8. An apparatus as set forth in claim **7**, wherein said

actuating means is arranged to couple said advancing means with said braking unit when at least one of said detecting members detects the absence of groups on said conveyor means.

9. An apparatus as set forth in claim **1**, wherein said actuating means comprises an electric switch which is movable between open and closed positions and normally assumes one of said positions, said detector means comprising a trip which moves said switch to the other position in response to detecton of the absence of groups on said conveyor means.

10. An apparatus as set forth in claim **1**, further comprising a feed for supplying rod-shaped articles to said conveyor means upstream of said transfer station and means for arresting said feed in response to detection of the absence of groups by said detector means.

11. An apparatus as set forth in claim **1**, wherein said actuating means comprises two electric switches each of which is movable between open and closed positions and normally assumes one of said positions, said detector means comprising two trips respectively located upstream and downstream of said transfer station and each arranged to move the corresponding switch to the other position upon detection of the absence of groups on said conveyor means, said clutch means being arranged to couple said advancing means with said braking unit when at least one of said switches is moved to said other position.

12. An apparatus as set forth in claim **11**, wherein each of said switches is open in said one position thereof and wherein said switches are connected in parallel, said actuating means comprising a solenoid connected in circuit with said switches and having a movable armature which operates said clutch means to couple said advancing means with said braking unit when said circuit is

completed across at least one of said switches to energize said solenoid.

13. An apparatus as set forth in claim **11**, wherein each of said switches is closed in said one position thereof and wherein said switches are connected in series, said actuating means further comprising a solenoid connected in circuit with said switches and having a movable armature which operates said clutch means to couple said advancing means with said braking unit when at least one of said switches is open to thus deenergize said solenoid.

14. An apparatus as set forth in claim **1**, wherein said actuating means comprises a delay device arranged to effect coupling of said advancing means with said drive unit with a delay following detection of groups by said detector means and to effect coupling of said advancing means with said braking unit with a delay following detection of the absence of groups on said conveyor means, said detector means comprising a detecting member located upstream of said transfer station and said delays being of such duration that a group detected by said detecting member reaches the transfer station when said advancing means is coupled to said drive unit and that the last group preceding detection of the absence of groups on said conveyor means reaches the transfer station prior to interruption of feed by said advancing means.

References Cited

UNITED STATES PATENTS

3,212,507	10/1965	Schubert	131—21
3,233,613	2/1966	Korber et al.	131—20
3,308,833	3/1967	Dearsley	131—94
3,306,306	2/1967	Rudszinat	131—94

HUGH R. CHAMBLEE, *Primary Examiner.*