Feb. 12, 1963 D. W. MOLINS ETAL 3,077,264

CIGARETTE-MAKING MACHINERY

Filed Feb. 5, 1960

4 Sheets-Sheet 1

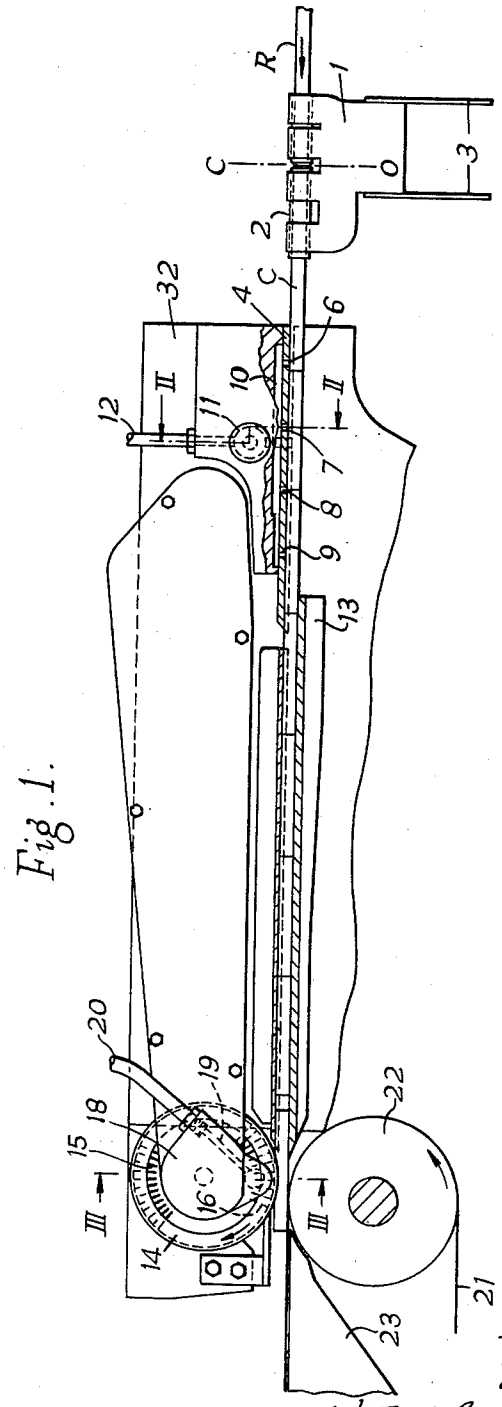


Fig. 1.

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Fig. 2.

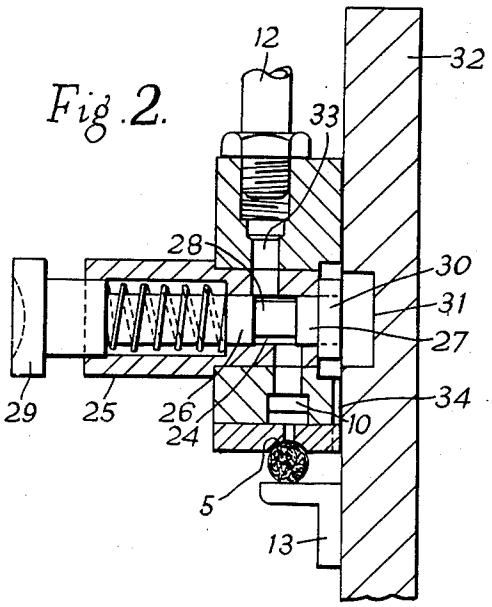
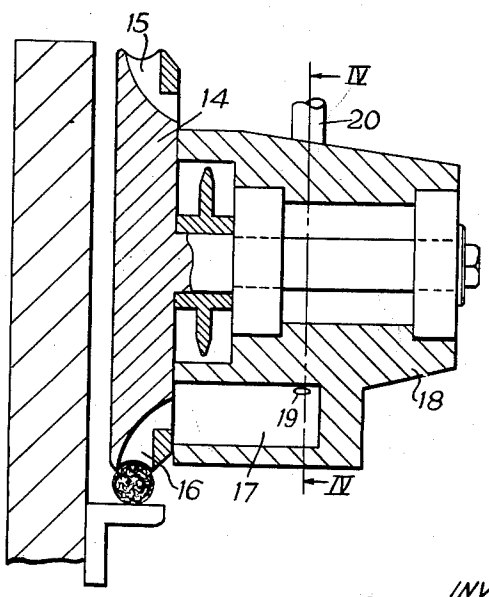


Fig. 3.



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Fig. 4.

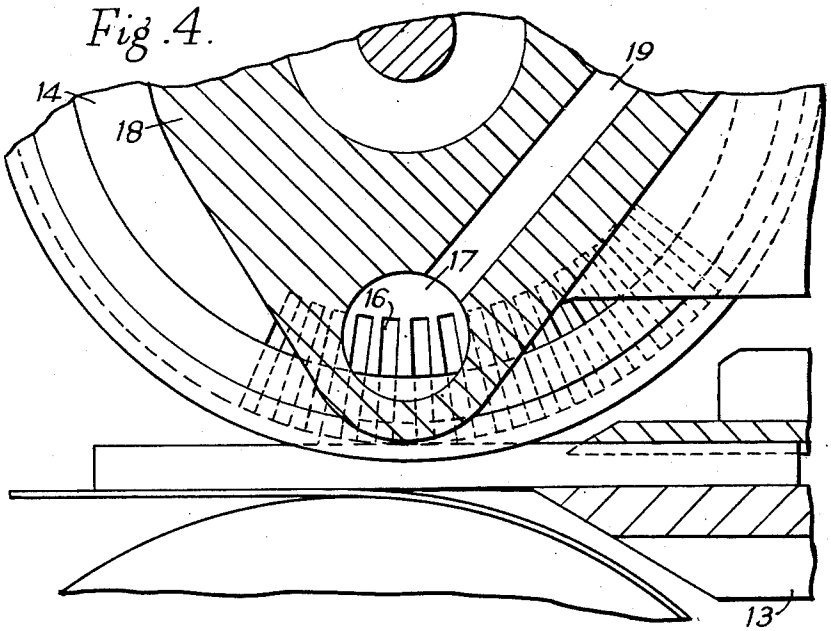
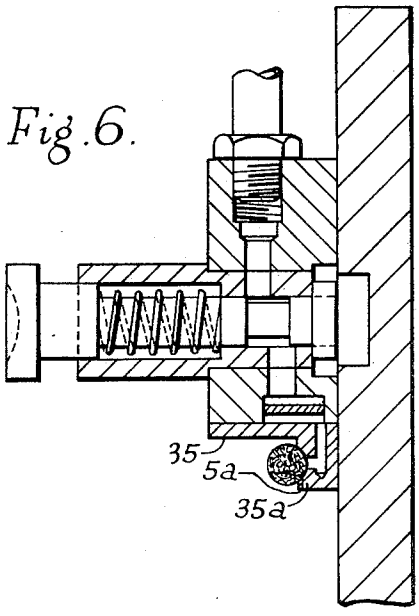


Fig. 6.



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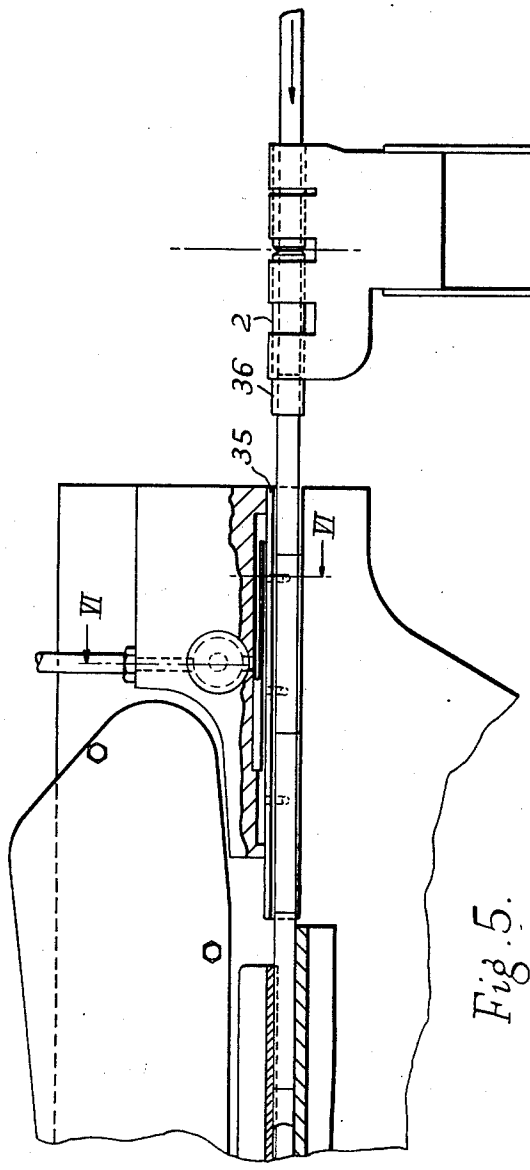


Fig. 5.

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CIGARETTE-MAKING MACHINERY

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Claims priority, application Great Britain Feb. 17, 1959
5 Claims. (Cl. 209—82)

This invention concerns improvements in or relating to continuous rod making apparatus such as continuous rod cigarette-making machinery.

In a continuous rod cigarette-making machine the continuous cigarette rod passes through cut-off mechanism by which it is cut at suitable intervals to produce separate lengths of rod, the rod being supported, during and immediately after cutting by a ledger device. These lengths may each constitute a finished cigarette, or where mouthpiece cigarettes are to be made, they may subsequently be joined to mouthpiece portions such as filter plugs.

It is, of course, required that successive cigarettes separated from the rod should be as far as practicable equal in length. It sometimes happens, however, that a cigarette substantially shorter than the required length issues from the cut-off mechanism, for example when the cigarette machine is started up after a stoppage. It is desirable to be able to eliminate any such short cigarettes from the product of the machine at an early stage. This is, for example, particularly so in a case where the cigarettes pass immediately from the cut-off mechanism to apparatus for assembling them with mouthpiece portions for making mouthpiece cigarettes, since a short cigarette may cause serious difficulties in the production of mouthpiece cigarettes.

Similarly when filter plugs or mouthpiece rods are made by a continuous rod process, the continuous rod is severed by cut-off mechanism to produce separate plug or mouthpiece rods, and it is desirable in this case also to eliminate any rods substantially shorter than the length required.

For convenience all separate pieces of rod of the required length or of an acceptable length cut from a continuous rod (e.g. a cigarette rod or a plug rod) will be referred to herein as "rods" while separate pieces substantially shorter than the required length and too short to be acceptable, will be referred to as "short rods." Where the rods referred to are cigarettes, a short rod will be referred to as a "short cigarette."

According to the present invention there is provided in a continuous rod machine, such as a continuous rod cigarette-making machine, apparatus for rejecting short rods (e.g. short cigarettes), comprising means for supporting rods which are moving endwise away from a cut-off mechanism, the means comprising a first support and a second support so spaced from each other that rods are supported thereby during part of their endwise movement, while short rods having a length less than the distance between the first and second supports, become unsupported during their endwise movement away from the cut-off mechanism and thus fall from the apparatus due to the action of gravity.

Preferably one of the supports includes a suction device having an opening connected to a suction source, the opening being arranged to engage the cylindrical surface of a rod which is thereby suctionally supported. The other of the supports may comprise a guide member located adjacent to a ledger device of the cut-off mechanism (e.g. forming part of the ledger device). The opening is formed in a guide-surface along which the rods can move in an endwise direction away from the cut-off mechanism, the rods being suctionally supported.

The device may further include means to cause the suction to be cut off from the suction opening, thereby removing suctional support and allowing any rods or short rods to fall which are within the range of action of the suction opening.

Still further, the invention provides, in a continuous-rod machine such as a continuous rod cigarette-making machine, means for spacing the rods (e.g. cigarettes) in regular sequence as they move endwise, the means comprising a rotating suction wheel which is provided with suction ports arranged to engage the cylindrical surfaces of the rods, the linear speed of the wheel at the point of contact between the wheel and the rods being in excess of the linear speed of the end-to-end rods so that the latter are successively moved apart by the wheel and thus spaced in regular endwise sequence.

A continuous rod cigarette making machine in accordance with the present invention will now be described by way of example, with reference to the accompanying drawings, in which:

FIGURE 1 is a side view, partly in section, of apparatus according to the invention,

FIGURE 2 is a section, to an enlarged scale, taken on the line II—II, FIGURE 1,

FIGURE 3 is a section taken on the line III—III, FIGURE 1,

FIGURE 4 is a side view, partly in section and to an enlarged scale, of a cigarette-length accelerator shown in FIGURE 1, taken on line IV—IV of FIGURE 3,

FIGURE 5 is a side view of an alternative arrangement to that shown in FIGURE 1,

FIGURE 6 is a section taken on the line VI—VI, FIGURE 5.

Referring first to FIGURE 1, tubular ledgers **1** and **2**, carried on supporting members **3**, are arranged to be reciprocated lengthwise of a continuous cigarette rod R so as to move forward with a cut-off knife, diagrammatically represented at CO, as the latter passes through the rod while moving forward with the rod, in known manner, the ledgers being separated to allow the knife to pass between them. The ledgers support the rod during cutting and also partially support a freshly cut cigarette-length C as the latter is moved lengthwise by the oncoming rod.

A shoe **4**, mounted in a position immediately above the path of the oncoming cigarettes, is provided with a longitudinal groove **5** (FIGURE 2), suitably shaped to accommodate cigarettes, and with suction ports **6**, **7**, **8** and **9**, communicating from the groove to a suction chamber **10**, from which air is drawn through a valve **11**, to be described later, and through a pipe **12**, by suitable suction means. The shoe **4** is adjustable lengthwise so that it can be positioned with the suction port **6** spaced from the left-hand side (as seen in FIGURE 1) of the ledger **2** by a distance greater than the maximum length of a short cigarette. This spacing will depend on the length of cigarette being made and on the speed at which the cigarette-making machine is being run.

Beyond the shoe **4** and located over the path of the oncoming cigarette-lengths is a suction wheel **14** arranged to rotate in the direction indicated by the arrow. The cigarettes, being pushed forward by the continuous-rod and being supported on a bracket **13**, reach the wheel **14** which is provided on its periphery with two groups of ports **15** and **16**, which communicate with a chamber **17** (FIGURE 3) in a suction hood **18**. The chamber **17** is maintained in a state of suction by means of a suction source in constant communication with the chamber **17** through an aperture **19** and through a pipe **20**. The chamber **17** is located in such a position that suction is only communicated to the ports **15** and **16** when they are at the lowermost portion of the wheel **14**, that is, suction is applied to those ports which are at any instant in engagement with a cigarette. The wheel **14** is arranged to rotate with a

peripheral speed in excess of the linear speed of the continuous cigarette rod, and hence of the cigarettes being pushed forward by the rod.

A perforated conveyor band 21 passes over a roller 22, which is arranged to rotate in the direction shown by the arrow, and extends over a suction chamber 23. The band 21 travels with a linear speed substantially the same as the peripheral speed of the wheel 14.

The suction source connected to the ports 6, 7, 8 and 9 can be cut off by means of the valve 11, details of which can be seen in FIGURE 2. The suction chamber 10 is connected to the suction source through a valve opening 24 contained in a valve body 25. The opening 24 is sealed by means of two pistons 26 and 27 carried on a spindle 28 of a spring-loaded push-button 29. To release the suction from the suction ports 6, 7, 8 and 9 the push-button 29 is depressed until a flange 30 is located against a recess 31 in a back plate 32. In this position the piston 26 seals off an opening 33 at the end of the pipe 12, while the piston 27 emerges from the opening 24 and allows atmospheric pressure to be admitted to the ports 6, 7, 8 and 9 through a groove 34.

It is customary for a continuous cigarette rod, such as the rod R, to be formed so that the overlap of the paper web containing the cut tobacco is arranged at the top, the two overlapping edges of the paper web being secured together by means of the application of adhesive. Frequently this adhesive is applied in excess so that a thin adhesive film may be deposited on any surface with which the overlap comes into rubbing contact. If such a film is deposited on the shoe 4, the suction ports 6, 7, 8 and 9 may eventually be closed by the film, thereby removing suctional support from the top portion of the cigarettes.

Accordingly, in a preferred example according to the invention, shown in FIGURES 5 and 6, the cylindrical surface of the cigarettes is side-supported by means of a side-supporting shoe 35, in which a groove 5*a* is formed in a vertical face 35*a* of the shoe, the suction ports being formed in the latter so as to communicate with the groove 5*a*.

An alternative means of adjusting the distance between the ledger 2 and the shoe 35, illustrated in FIGURE 5 but also applicable to the construction shown in FIGURE 1, consists in fitting an extension piece 36, of a suitable length, to the ledger 2. This eliminates the need for altering the position of the shoe 35 or of the shoe 4 as the case may be, and thereby simplifies adjustment for cigarettes of different lengths.

The operation of the apparatus is as follows, with reference to FIGURES 1, 2, 3 and 4.

As the cigarette rod passes through the ledger 2, the knife CO periodically cuts through the rod to form separate cigarettes C. These are immediately pushed forward by the oncoming rod at the speed of the latter. As a cigarette moves lengthwise from the ledger, its leading end portion, which is unsupported, moves beneath the shoe 4, while its rear end portion is still supported by the ledger 2. The unsupported leading end portion of the cigarette starts to fall downwardly as soon as it is free to do so, but the forward speed of the cigarette is such that before its leading end has had an opportunity to move any material distance downwardly, it is (assuming the cigarette is not a short cigarette) within the effective range of action of the first of the suction ports 6, and it is accordingly suctionally supported against downward movement and held in engagement with the shaped groove in the undersurface of the shoe. It is pushed along this groove by succeeding cigarettes through which the continuous rod acts, until it comes beneath the suction wheel 14, the cigarette being in register with the suction ports on the periphery of the latter. Owing to the greater peripheral speed of the wheel 14, each cigarette engaged thereby is accelerated and spaced endwise from the next succeeding cigarette, and this spacing is maintained by the suction conveyor 21 which moves at the higher speed, as mentioned above.

If now the machine is stopped and restarted, the first length to be cut from the rod will in all probability be shorter than the required cigarette length. This short cigarette, on moving from the ledger, will be unable to reach the first suction port 6 before its leading end portion has fallen too far to be affected by the suction, and it will therefore fall away. If for any reason the second cigarette should be too short, it too will fail to come within the range of action of the first suction port 6, and will fall away.

Further, when the machine is stopped, due to a break in the cigarette rod, there may be a short cigarette in the ledger—namely the last portion of the cigarette rod to enter the ledger. In such a case, when the machine is restarted this short cigarette will be pushed forward. If now a group of cigarettes is at that time suctionally held on the shoe 4, the short cigarette may, when pushed forward by restarting of the machine, be capable of bridging the gap between the ledger and the first suction port by reason of friction between its end faces and the abutting end faces of the cigarettes immediately preceding and following it. In that case it would be fed forwardly and not rejected.

Accordingly, means are provided in the valve 11 to cause the suction to be cut off from the ports 6, 7, 8 and 9, so as to release all cigarettes which are suctionally held to the shoe 4, and allow them to fall away. Thus when the machine is restarted, the short cigarette on being pushed from the ledger will fall away as described above.

It will be appreciated that in addition to the disadvantages resulting from the presence of short cigarettes in the product of the cigarette-making machine, there is an additional disadvantage that the passage of a short cigarette will disturb the timing of cigarettes in relation to mechanism for performing subsequent operations, such as deflecting the cigarettes sideways. Such mechanism in a cigarette-making machine is operated in timed relationship with the cut-off mechanism, and where the freshly cut cigarettes coming from the cut-off mechanism are (as in the present case) pushed some distance lengthwise before being positively carried forward by conveyor devices, the correct location of those cigarettes in relation to subsequent apparatus depends on the cigarettes all having the required length. Thus the presence of a short cigarette can upset the correct location of the cigarettes.

As the cigarettes are pushed past the end of the shoe 4 they are successively engaged by the suction wheel 14 and suctionally engaged by the peripheral ports on the wheel. In this way they are successively accelerated and spaced apart, and pass on to the suction conveyor 21 which carries them lengthwise in spaced relationship.

The operation of the preferred example shown in FIGURES 5 and 6 is basically as described above except that a cigarette, being pushed forward by the oncoming rod as it leaves the ledger 2, moves into contact with the groove 5*a* and is thereby suctionally supported against downward movement. If an excess of adhesive has been applied to the lap joint of a cigarette, there will thus be no rubbing contact between the lap joint and the shoe and, therefore, no possibility of an adhesive film being deposited over the suction ports.

The extension piece 36 is fitted to the ledger 2 so as to allow the distance between the first and second supports to be varied in accordance with any variation in the length of the cigarettes which are desired to be manufactured.

The above description relates to a continuous rod cigarette making machine, but it will be understood that the construction shown and described could be equally provided after the cut-off and before the deflectors of a continuous rod filter plug machine, such as described in

United States patent specification No. 2,145,528 and United States patent application Serial No. 839,216, now abandoned.

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

1. In a continuous rod machine, such as a continuous rod cigarette making machine, apparatus for rejecting short rods, comprising means for supporting rods which are moving endwise away from a cut-off mechanism, said means comprising a first support and a second support so spaced from each other that normal length rods are supported thereby during part of their endwise movement, while short rods having a length less than the distance between the first and second supports fail to come within the range of supporting action of the second support during their endwise movement away from the cut-off mechanism and thus fall from the apparatus due to the action of gravity, wherein there is included means for spacing the rods in regular sequence as they move endwise, comprising a rotating suction wheel which is provided with suction ports arranged to engage the cylindrical surface of the rods, the linear speed of the wheel at the point of contact between the wheel and the rods being in excess of the linear speed of the end-to-end rods so that the latter are successively moved apart by the said wheel and thus spaced in regular endwise sequence.

2. In a machine for feeding cylindrical rod-like articles such as cigarettes, feeding means to feed cylindrical rod-like articles endwise in succession, said means including a support for the endwise moving articles, a rotating suction wheel arranged for rotation about an axis transverse to the direction of endwise movement of the articles, and having peripheral suction ports, the said wheel being so located adjacent the said support that the wheel can engage the cylindrical surfaces of articles, the linear speed of the wheel at the points of contact between the wheel and the articles being in excess of the speed at which the articles are fed endwise by the said feeding means, and means to apply suction to the said suction ports so as to cause the suction wheel to accelerate successive articles engaged thereby and space them apart endwise, the suction ports being so disposed around the wheel as to register with successive articles moving past the wheel.

3. In a machine comprising means to form a continuous rod, means to feed the said continuous rod endwise, cut-off mechanism operative on the continuous endwise moving rod to cut the rod at intervals and thereby produce separate rod lengths which are pushed endwise by the endwise moving continuous rod, the improvement comprising a ledger device to support the continuous rod while it is being cut and to support a freshly cut rod length adjacent its rear end, and a support device arranged to engage such a rod length adjacent its leading

end to support its leading end part, the said support device and the said ledger device being spaced apart, in the direction of endwise travel of a rod length from the cut-off mechanism, by a distance such that only a rod length of a required minimum length can, during said endwise travel, come within the range of supporting action of the said support device, while short rod lengths fail to come within the said range and thus fall from the ledger device by gravity.

4. In a continuous rod machine having cut-off mechanism operative periodically on a continuous endwise moving rod to cut the rod and thereby produce separate rod lengths, and a ledger device to support the continuous rod while it is being cut and to give temporary support to one end portion of a freshly cut rod length, means to receive rod lengths from the cut-off mechanism, comprising an element located adjacent the path of endwise moving rod lengths and having a surface along which rod lengths can slide endwise, said surface having suction ports therein and being so disposed that rod lengths can be supported thereon by suction alone against the action of gravity, said element being spaced from the ledger device by a distance such that only rod lengths having a desired length can, when moving endwise from the cut-off mechanism, reach a position at which the said surface suctionally attracts their leading end portions, while short rod lengths fail to reach said position and fall by gravity to be rejected.

5. In a continuous rod machine having cut-off mechanism operative periodically on a continuous endwise moving rod to cut the rod and thereby produce separate rod lengths, and a ledger device to support the continuous rod while it is being cut, means to receive rod lengths from the cut-off mechanism, comprising an element located adjacent the path of endwise moving rod lengths and having a surface along which the rod lengths can be slid endwise by further rod lengths moving endwise from the cut-off mechanism, said surface having suction ports and being so disposed that rod lengths can be supported thereon by suction alone against the action of gravity, and means whereby suction can be cut off to cause rod lengths supported suctionally on said surface to fall therefrom by gravity.

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