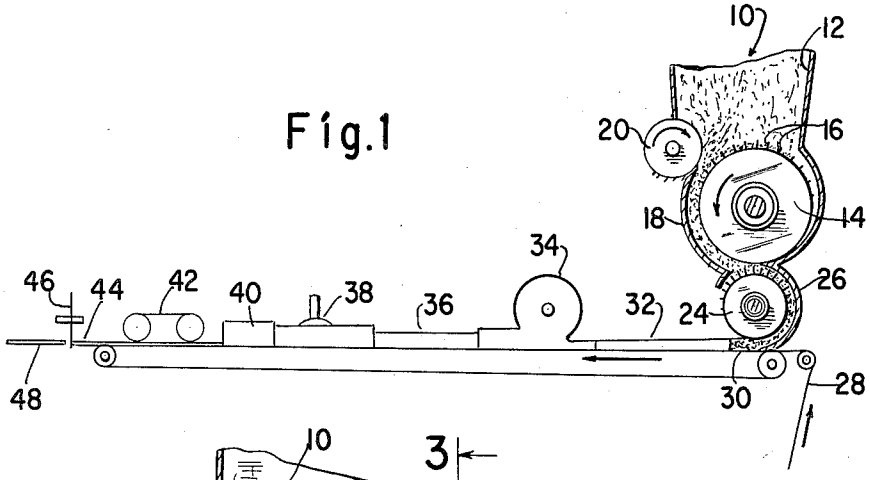
July 27, 1965 J. R. PINKHAM 3,196,880

CIGARETTE MAKING MACHINE

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Fig.1



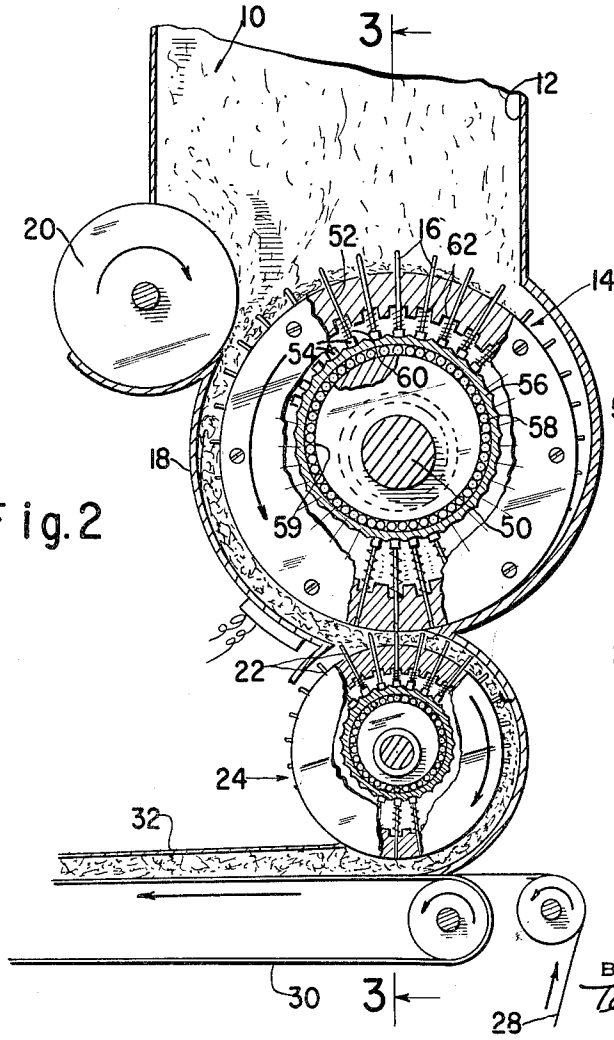
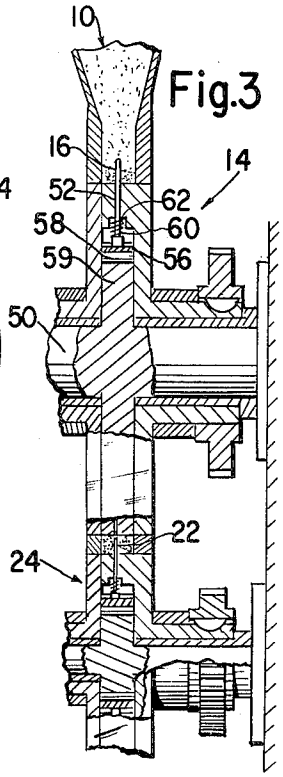


Fig.2

Fig.3



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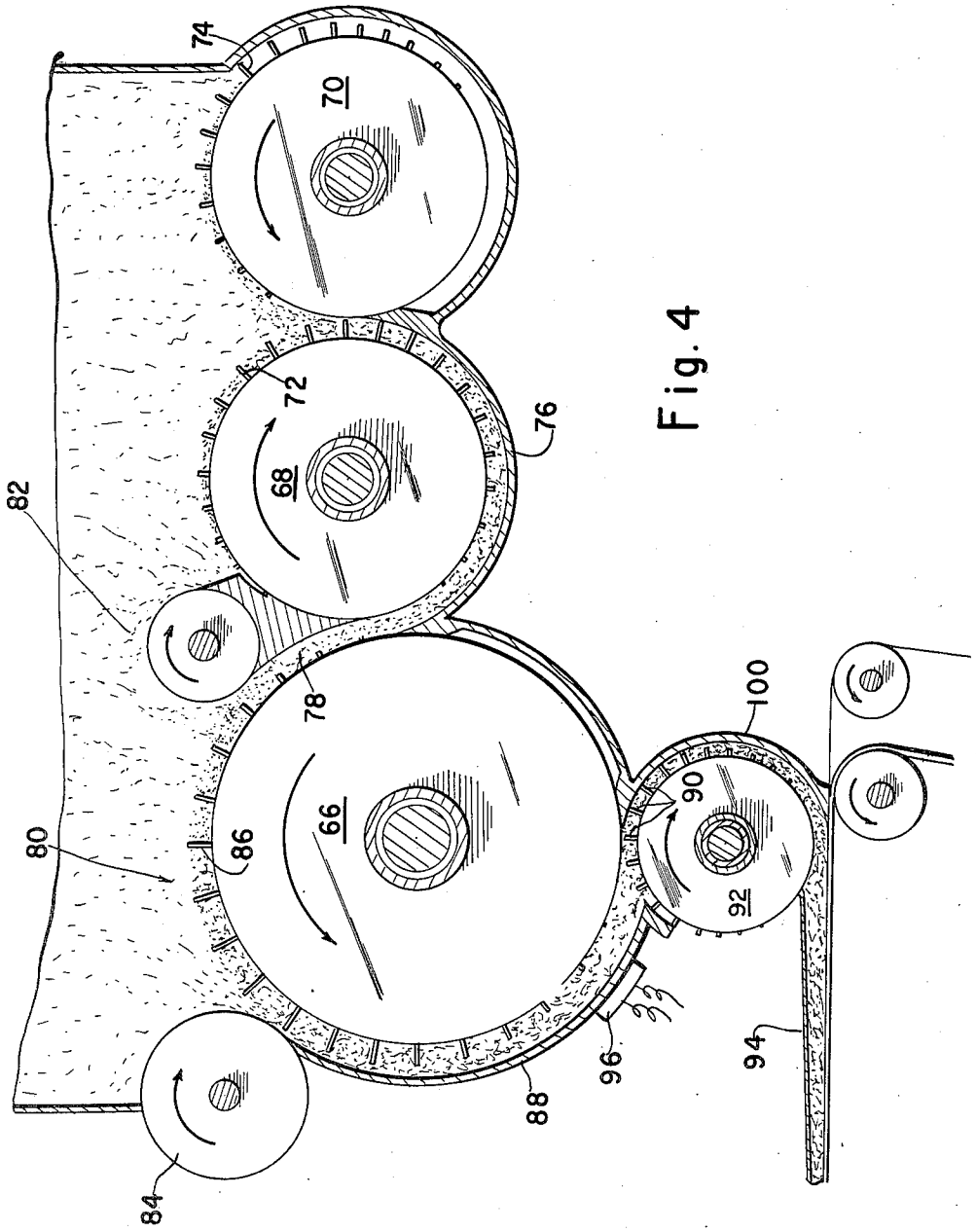


Fig. 4

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CIGARETTE MAKING MACHINE

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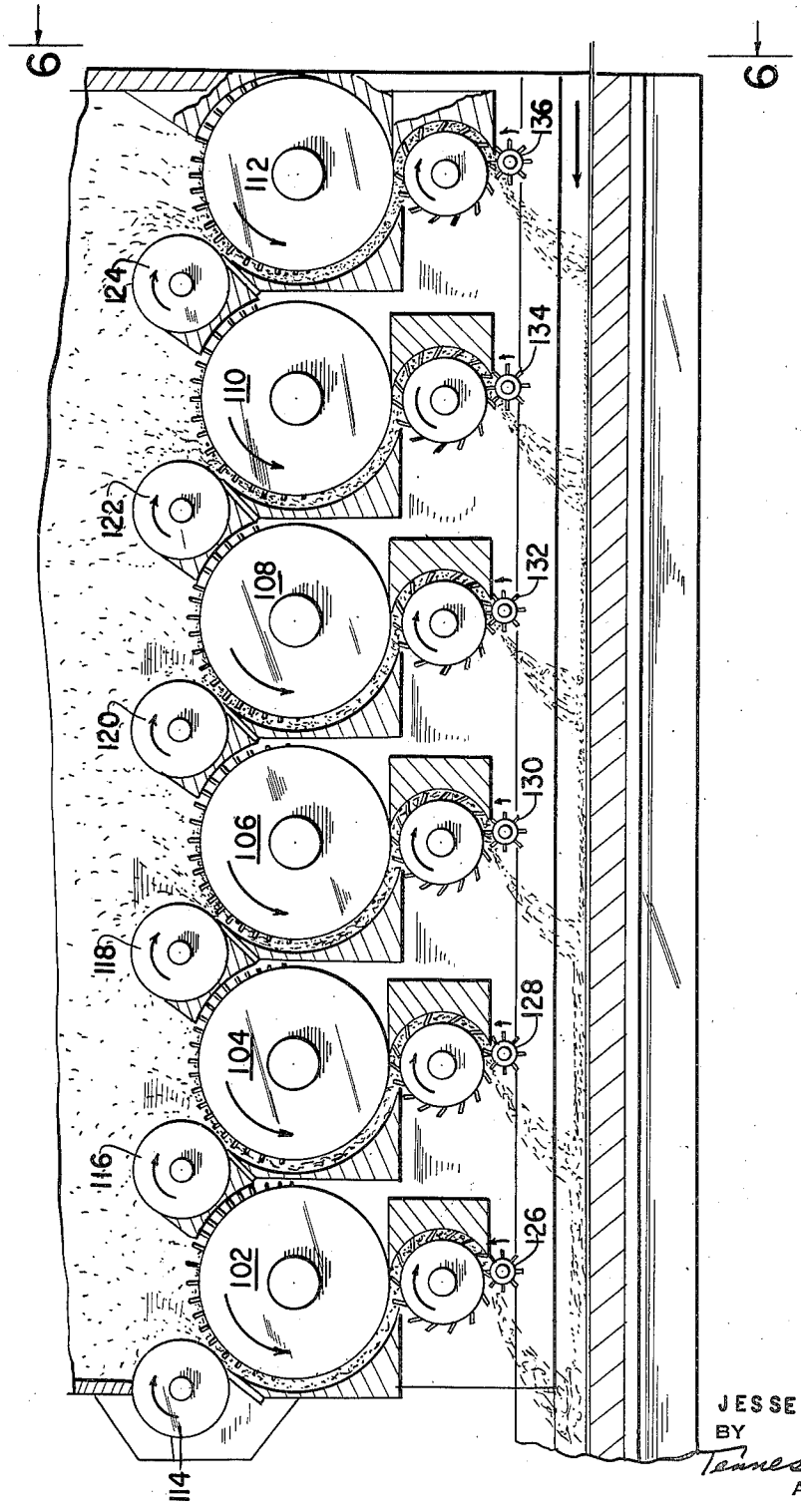


Fig. 5

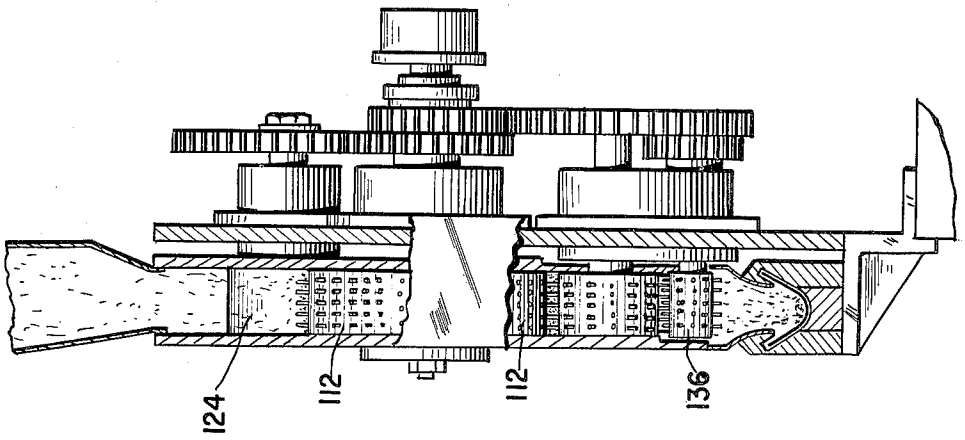
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CIGARETTE MAKING MACHINE

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Fig. 6



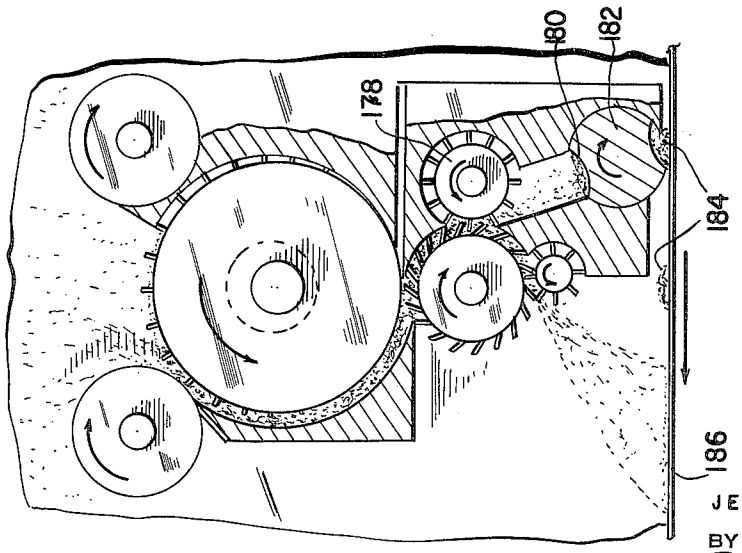


Fig. 9

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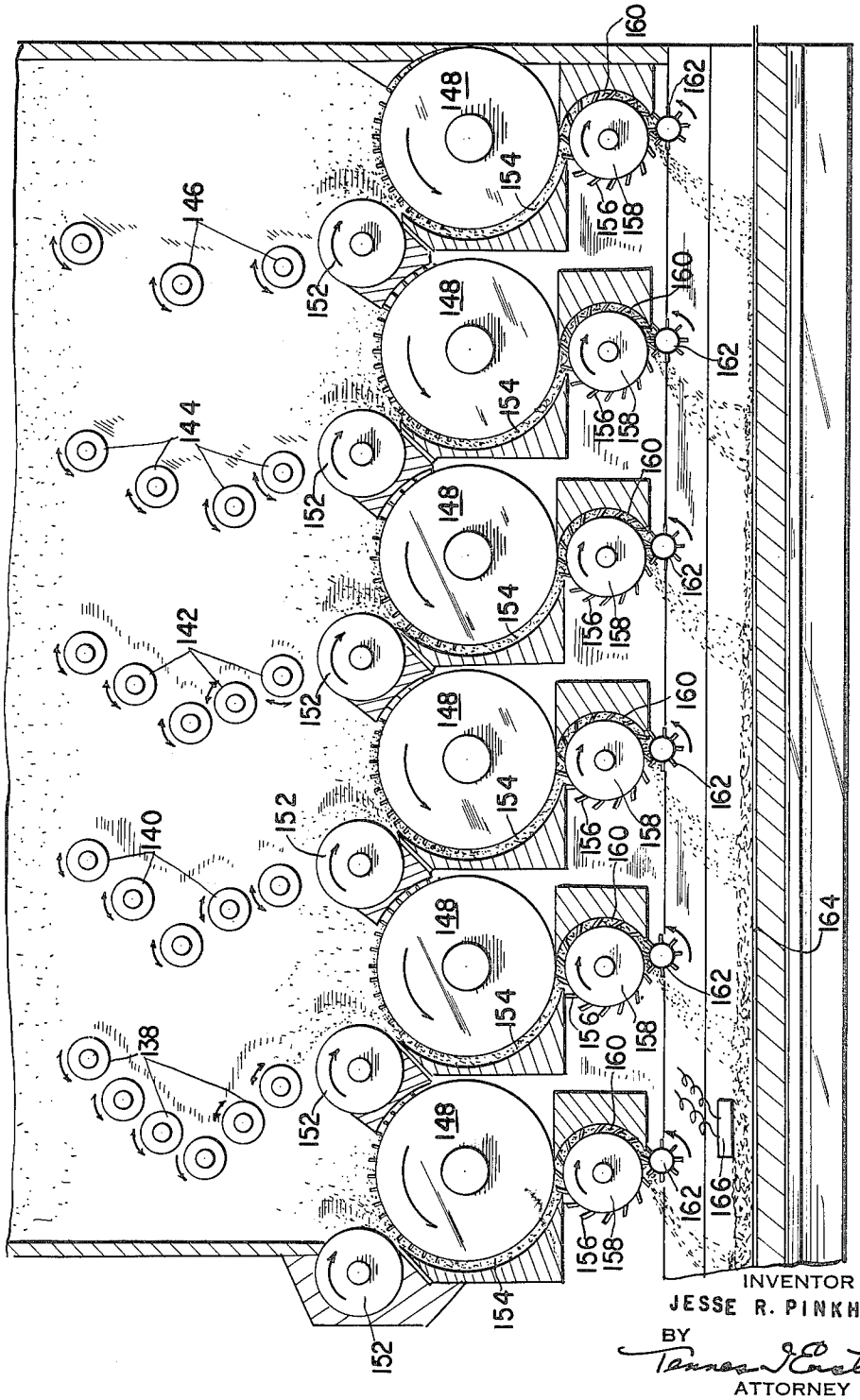


Fig. 7

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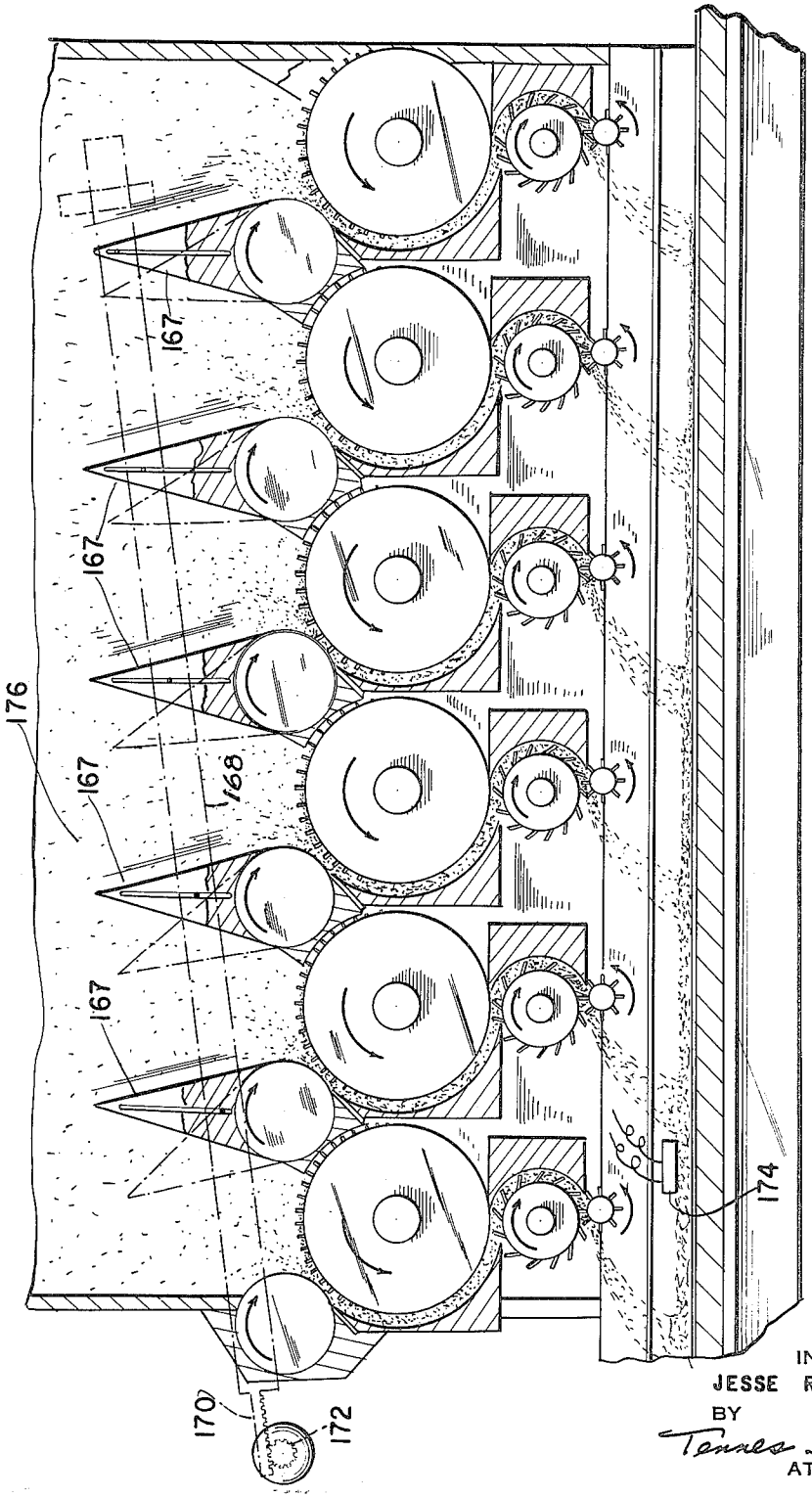


Fig. 8

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United States Patent Office 3,196,880 Patented July 27, 1965

3,196,880

CIGARETTE MAKING MACHINE

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Filed Oct. 5, 1961, Ser. No. 143,161
4 Claims. (Cl. 131—84)

This invention relates to a continuous rod cigarette making machine and more particularly to an apparatus for feeding shredded cigarette tobacco to be formed into a continuous cigarette rod.

Various developments have been devised for obtaining a uniform feed of shredded tobacco. It is well known that if the feeding of shredded tobacco is effected uniformly it is much easier to obtain a cigarette rod of constant uniform density. Also, one of the most limiting factors to increasing the speed of conventional cigarette machines is associated with the collecting of the feed metering section shower on the trough collector belt. The collector belt normally runs at cigarette rod speed, and when the speed of the trough collector belt is increased the tobacco becomes unstable when it engages the belt. It is also known that stratification becomes more pronounced as the free flight distance of tobacco increases. The condition is aggravated as a result of the bouncing of the shreds, incident to a longer flight, and as a result of the inevitable lumps in the tobacco shower, which form small mounds in the stream upon landing and then further interfere with a uniform distribution of the continually showering tobacco on the belt in the belt feeding region by shielding the dales produced by the mounds. It has been confirmed by tests that weight variations increase as the belt speed in the belt feeding region increases.

In the present invention the horizontal component of velocity imposed on the trajectory of the tobacco shreds can be made equal to the belt speed and, by means of picking at a lower level, and at a lower rate of speed, the vertical component of velocity of the shreds can be kept to a minimum, to reduce the bouncing of the shreds.

It is, therefore, an object of the present invention to provide a feed for a cigarette making machine which will provide a uniform stream of tobacco at high rates of speed.

Another object of this invention is to provide a drum for receiving shredded tobacco on its periphery and positively forwarding the tobacco so received on the periphery by means of carding pins which are withdrawn at the location where the shredded tobacco is discharged from the drum.

Another object of this invention is to provide a series of aligned narrow drums for collecting shredded tobacco and using extendable pins for preventing tangential displacement of the the tobacco as it is forwarded by said wheels to the rod forming mechanism of a cigarette making machine.

Other objects and features of the invention will appear as the description of the particular embodiment selected to illustrate the invention progresses. In the accompanying drawings, which form a part of this specification, like characters of reference have been applied to corresponding parts throughout the several views which make up the drawings.

FIGURE 1 shows an in-line feed wheel, in vertical section and with the housing broken away, for receiving, compacting and delivering a stream of showered tobacco directly into the rod forming mechanism of a cigarette making machine.

FIGURE 2 is an enlarged vertical sectional view of the feed wheel shown in FIGURE 1.

FIGURE 3 is an axial vertical section taken as indicated by line 3—3 in FIGURE 2.

FIGURE 4 represents a vertical sectional view, with the front of the housing broken away, through a series connected group of pinwheels of a modification of the embodiment of FIGS. 1, 2 and 3 for receiving and forwarding shredded tobacco in an elongated stream to the rod forming mechanism of a cigarette making machine.

FIGURE 5 is a similar vertical section showing another modification of my invention, in which there is employed a multiple number of in-line metering feeds incorporating retractable pins.

FIGURE 6 is an end view taken as indicated by lines 6—6 in FIGURE 5, with certain obstructing parts of the housing being broken away.

FIGURE 7 is a further vertical sectional view showing another modification of my invention, in which there is employed a multiple in-line metering feed having directional shower control rollers.

FIGURE 8 similarly illustrates a further modification of my invention, in which pivoting baffles are employed for controlling the distribution of the showered tobacco; and

FIGURE 9 illustrates a final modified form of my invention involving a retractable, in-line feed drum having a dense end attachment.

Referring to FIGURE 1, tobacco shreds 10 are showered into a chute 12 where they fall downwardly on top of the pinwheel 14 having retractable pins 16. The pinwheel 14, rotating in the direction indicated by the arrow, carries with it, by means of pins 16, the shredded tobacco which is thereby moved along within a concave 18 forming an outer guide means. A wheel 20, rotating in the direction indicated by the arrow, pushes the tobacco into the pins 16.

A substantially regulated or metered stream of tobacco is thereby established, and as this tobacco is forwarded along the concave 18 by means of the pins 16, any hollow areas will tend to be filled. As the tobacco carried by these pins approaches the lower side of concave 18, the pins 16 are gradually withdrawn and tobacco is delivered to the retractable pins 22 of the pinwheel 24. The pins 22 forward the tobacco so received around the concave 26 and discharge the tobacco onto a paper tape 28 which is supported on the rod folder web 30.

The timing of the apparatus is such that the pinwheel 14 travels at a faster rate than the pinwheel 24, which thereby causes compaction to be imparted to the shredded tobacco so conveyed. The tobacco conveyed by the pinwheel 24 is delivered under a stripping member comprising a tongue 32, which rides against the pinwheel 24. The pins 22 are withdrawn as they reach the lower portion of the path of travel of pinwheel 24, so as to facilitate a smooth, uninterrupted discharge of the compacted tobacco stream onto the paper tape 28.

The compacted tobacco passing under the tongue 32 then proceeds under a suitable compressor wheel 34, after which the paper tape 28 and folder web 30 are partially wrapped around the tobacco stream in the compressor box 36.

An upwardly extending edge of the paper tape 28 passes the paste applying wheel 38 which applies a bead of paste to this upwardly extending edge. From there it passes through the folder section 40, where this upwardly extending edge of paper tape 28 is lapped over the opposite edge of the paper to form a cigarette rod. After the cigarette rod emerges from the folder 40 the pasted seam of the rod is dried by means of the heated ironing belt 42.

After the formed cigarette rod 44 leaves the rod folder web 30 it passes the cut-off knife 46 which severs cigarettes 48 from the leading end of the rod.

Referring to FIGURE 2, I have shown the manner in which the pins **16** are mounted so as to effect their gradual withdrawal as the tobacco is about to be discharged. The pinwheel **14** is concentrically mounted on the center shaft **50** for rotation about the axis thereof, and carries the pins **16** which slide radially inwardly and outwardly in suitable holes **52** formed in wheel **14**. The inner end of each pin **16** has a fixed collar **54** which engages the sleeve **56**. The sleeve **56** travels on suitable roller bearings **58** which are supported between the sleeve **56** and a fixed inner eccentric cam **59**. A suitable coil spring **60** is mounted on each pin **52** and exerts pressure between the inside surface **62** of the pinwheel **14** and its associated collar **54**, thus urging this collar against the sleeve **56**.

It will, therefore, be apparent that as the pinwheel **14** rotates about the axis of shaft **50** its peripheral surface will be concentric therewith. Therefore, as pinwheel **14** rotates with the pins **16**, each of the collar **54** will also be riding concentrically around the shaft **50**. As the pins **16** rotate with pinwheel **14**, the collars **54** ride against the inner sleeve **56**. The inner shell **56** travels around the cam **59** on bearings **58**. This causes pins **16** to be moved radially inwardly and outwardly in the holes **52** formed in the pinwheel **14**, because of the radial movements of collars **54** relative to pinwheel **14** as collars **54** ride on the eccentric cam **59**. As may be seen in FIGURE 2, the radially inner and outer rims of the internal peripheral annular member have surfaces which are substantially cylindrical and concentric with the shaft **50** whereby space is provided within the pinwheel for the expansion of the springs **60** in the lower portion of the wheel as illustrated.

It will thus be evident that as tobacco is showered downwardly onto the upper periphery of wheel **14** the pins **16** will be extending upwardly, and as pinwheel **14** rotates in the direction indicated by the arrow the pins **16** will positively advance the showered tobacco **10** around concave **18**. Since the peripheral speed of travel of pinwheel **14** is faster than the rate of travel of pinwheel **24**, the tobacco located between concave **18** and wheel **14** will be compacted. The wheel **24**, which receives this compacted tobacco, has a similar set of retractable pins **22**, which again hold the tobacco against relative displacement and forward the same beneath the rod forming tongue **32**.

Reference to FIG. 2, shows important features of the invention. It will be observed that the path taken by the tobacco stream inter-connecting the tobacco receiving station, where the tobacco from hopper **12** drops onto the rim of wheel **14**, and the delivery station, at the junction of wheel **24** and conveyor **30**, is in the form of a distorted S. The coaction of pins **16** and the concave **18**, together with the effect of the faster speed of the rim of wheel **14** than that of the rim **24**, compact the tobacco stream both radially and along its line of motion, particularly near the start of the conveyance of the tobacco. The rims of both wheels are so disposed in the portion connecting the two channels, formed between each concave and its respective wheel, that the space therebetween is constricted to compact the tobacco transversely, beween the wheels. Further, it will be noted that in the interconnecting passage the pins on the upper wheel are completely withdrawn and that those on the lower wheel are extended substantially to their maximum distances, so that they successively engage the upper wheels to tend to promote a complete transfer of all of the tobacco in the stream from the upper to the lower wheel. And finally, it is noted that the pins on the lower wheel tend to maintain the compacted condition of the tobacco in the stream as it is being delivered to the conveyor **30**.

FIGURE 4 shows a modified form of my invention wherein tobacco is showered on top of a series of aligned pinwheels **66**, **68** and **70**. The pinwheel **70** delivers the tobacco on its surface into contact with the periphery of wheel **68**, where the extended pins **72** take over the tobacco so delivered as well as additional tobacco **82** showered on its upper surface. The pins **74** on pinwheel **70** are so constructed and arranged that while they positively forward the collected tobacco into the range of action of pinwheel **68**, they withdraw at this point to facilitate the pickup by pins **72**. Pinwheels **66**, **68** and **70** may be rotated at the same peripheral speed. If desired, wheel **70** may be rotated faster than wheel **68** and wheel **68** may be rotated faster than wheel **66** to compact the tobacco as it is conveyed thereby substantially as previously described.

The pins **72** forward tobacco around concave **76** and as these pins approach the pinwheel **66** they in turn also withdraw. The pins **86** then commence projecting into the tobacco stream **78** and carry this tobacco stream around the surface of pinwheel **66**, collecting on its upper surface additional tobacco **80** from the shower **82**. A wheel **84** presses the tobacco **80** firmly into the pins **86** and the wheel **66**, rotating in the direction indicated by the arrow, carries the tobacco around the concave **88** into the range of operation of the pins **90** of pinwheel **92**.

As pinwheel **66** rotates, the pins **86** are withdrawn as they approach their lowermost path of travel. Since the pinwheel **66** rotates at a faster rate than that of pinwheel **92**, it causes the tobacco between concave **88** and the wheel **66** to be compacted as previously described with reference to FIGURES 1 and 2, thereby to fill in any hollow portions that may exist at this time in the tobacco stream. By filling in the hollow portions in this manner, a more uniform rod will be formed as the tobacco passes through the rod forming tongue **94** and thence through other rod forming elements well known in the cigarette making art.

Suitable detecting means **96**, such as a dielectric detector or other means, may be employed in association with the concave **88** to measure whether or not there are any hollow or less dense portions in the tobacco stream. The detector **96** may be used to control the speed of pinwheel **66** and thereby control the amount of axial compaction that is effected on the filler stream. The measurements made by detector **96** may also be used to control the rate at which tobacco is showered onto the aligned pinwheels **66**, **68** and **70**.

From the forgoing it will be apparent that I have provided means for receiving a metered shower of tobacco, firmly securing it against displacement and forwarding it at a high rate of speed along a linear path of travel without disrupting the uniform compaction of the tobacco. Not only is the uniformity not interrupted, but by means of the compacting wheel which assists in pressing the tobacco down upon the carding or pins of the in-line feeders, any hollow portions are filled in. Should there be hollow spots still remaining after this operation, they are in turn filled in due to the higher speed of the upper pinwheel with respect to the lower pinwheel. I have thus attained the objective of feeding a filler stream at a high rate of speed without losing any of its uniformity and, in addition, have increased its uniformity.

Referring to FIGURES 5 and 6, I have shown a multiple number of aligned feeders comprising pinwheels **102** to **112**. In this case, instead of successively feeding from one pinwheel to the next as shown in FIGURE 4, I have shown how each of these pinwheels may discharge tobacco onto a collecting conveyor which will form a stream of substantially rod-size cross section.

The tobacco gathered on the pinwheels **102**, **104**, **106**, **108**, **110** and **112** is compacted into the pins carried thereby by suitable pressing rollers **114** to **124**. Tobacco so picked up by each of the pinwheels **102**, **104**, **106**, **108**, **110** and **112** is in turn delivered to a second set of pinwheels therebelow. The tobacco is then removed from this second set of pinwheels by means of suitable pickers **126**, **128**, **130**, **132**, **134** and **136**. These pickers discharge the tobacco on top of and in the direction of travel of the rod forming tape. The rod forming tape then forwards

the stream of tobacco to the rod forming mechanism in the manner previously described in connection with FIGURES 1 to 4.

Since I have already described how the pins provided in the pinwheel may be made retractable in connection with FIGURES 1 to 4, a further description with respect to such details has been omitted for brevity. The embodiment in this case provides for a plurality of positive feeds and is capable of handling tobacco faster and under more positive control than was heretofore possible. In addition, the tobacco is given an impetus in the direction in which the tobacco stream travels with the collecting web, thereby avoiding any disruption in the uniformity of the filler when it forms the filler stream on the collecting conveyor.

Referring to FIGURE 7, I have shown a structure which is somewhat similar to that shown in FIGURES 5 and 6. In this case, however, I have also provided a series of directional feed rollers **138**, **140**, **142**, **144** and **146** which may be rotated either in a clockwise or counterclockwise direction. This feature enables the operator to distribute the tobacco being delivered to the pinwheels as desired to cause tobacco to be deposited on the rod forming conveyor in the proportional quantities best suited for the kind of tobacco being used.

The tobacco which passes these directional feed rollers falls on the peripheries of the feed rollers **148**. The feed rollers **148** have retractable pins so that the tobacco has no tangential slippage once it comes in contact with the feed rollers **148**. Compactor rollers **152** push tobacco into the pins of rollers **148** and tobacco is then carried around the concaves **154**. By the time tobacco reaches the lower runs of the feed wheels **148**, the pins thereof will have been retracted in the manner previously described. The tobacco filler is then engaged by pins **156** carried on wheels **158**. These pins likewise may be made retractable and the tobacco so received is forwarded around the associated concaves **160**.

The feed rollers **148** may be driven at a rate in excess of the peripheral speed of travel of wheels **158** so as to effect some compaction on the tobacco stream and thereby fill in any hollows. The tobacco carried by the pins **156** is picked off wheels **158** by picker wheels **162** which travel in the direction indicated by the arrow. The picked tobacco is then discharged onto the rod forming tape **164**. The final quantity of tobacco built up in this manner on the rod forming tape **164** may be of the density required in the final cigarette rod to be formed.

To even out any inaccuracies that might exist, a suitable conventional detecting device **166** may be employed to control the direction of rotation of the directional feed rollers **138** to **146**, thereby to provide for the delivery of tobacco to the rod forming tape **164** in the manner giving the most uniform stream.

Similarly, a conventional detector can be employed in conjunction with a device for feeding individual increments of tobacco to add to the final stream and thereby fill in any hollow areas that might exist. Such a device is shown and described in the copending patent application of Arthur Bell, Serial No. 712,990, filed February 3, 1959, now abandoned.

In FIGURE 8 I have shown still another embodiment of my invention. In this case, instead of using directional feed rollers such as the rollers **138** shown in FIGURE 7, I have instead employed deflecting vanes **167** which are adjustable by means of a connecting bar **168** that is actuated by a suitable rack **170** from a drive **172**. The drive **172** is controlled by a suitable conventional detector **174**. Each of the deflecting vanes **167** is pivotally mounted so as to permit it to feed more or less tobacco from the shower **176** to its respective feed wheel. The deflecting vanes may be of a pyramidal configuration so that the sides are self clearing and shreds do not pile up on the same. Since I have already described hereinabove the manner in which the coacting compressor rollers, retractable pin feed wheels and picker wheels operate, I have for reasons of brevity omitted a description of the same in this figure.

In FIGURE 9 I have shown another embodiment of my invention wherein I have provided a dense end device, by which is meant a device which increases the quantity of tobacco at the ends of the cigarette, to minimize dislodgement of the tobacco shreds at the cigarette ends. This device may be readily incorporated with my retractable pin feed rollers so as to remove a portion of the tobacco from one of the feed wheels by means of a picker **178** and accumulate this in suitable pockets **180** formed in a wheel **182**. The accumulations **184** are emptied at predetermined intervals onto the collector belt **186**.

If one of the centrally located feed wheels is selected to effect accumulation, in the final stream the successive accumulations **184** will ultimately be positioned between the shreds deposited form the adjoining feed wheels. The exact manner in which the dense end accumulations are accumulated and deposited on the conveyor may be varied by the manufacturer as might be best suited for the particular tobacco being processed.

From the foregoing description it will be clear that my invention provides for the handling of showered tobacco in such a way that there is more positive and individual control over the shredded tobacco being fed than was obtainable heretofore and that the control is maintained up to and including the time the shreds are deposited on the collecting conveyor. Through this type of positive control, the speed at which tobacco shreds are fed may be increased without any interference with the uniformity of the tobacco.

In addition, I have provided a number of embodiments which give this new type of feed a flexibility which is readily adapted to processing of tobacco of different characteristics but without the necessity of changing the rate at which give this new type of feed a flexibility which is readmaking machine. In addition, my invention is very adaptable to the incorporation of a dense end device whereby at regular intervals individual quantities of tobacco may be deposited on the collecting conveyor, so that when the ciagrette rod is finally severed the ends of the individual cigarette lengths will have a greater concentration of tobacco than the rest of the cigarette to minimize the quantity of tobacco which drops out of the ends of the cigarettes.

The invention hereinabove described may, therefore, be varied in construction within the scope of the claims, for the particular means selected to illustrate the invention is intended to exemplify the many possible embodiments of the same. The invention, therefore, is not to be restricted to the precise details of the structures shown and described.

What is claimed is:

1. A mechanism for feeding a stream of tobacco to a cigarette rod former, said mechanism comprising a first and a second tobacco conveying wheel, said wheels operable in opposite directions, a first and a second rim on said first and said second wheel, respectively, a source of tobacco, a receiving station at the input to said first wheel, a delivery station at the output of said second wheel, means for showering tobacco from said source onto said first rim at said receiving station, means for delivering tobacco from said delivery station toward said rod former, means coacting with said wheels for forming a confined distorted S shaped passage for said stream extending from said receiving station to said delivery station, said passage extending around one side of said first rim, through a constricted transfer space between said rims, and around the opposite side of said second rim, a first and a second set of pins, each set projectable through and, withdrawable within said first and said second rim, respectively, during each rotation thereof, control means for actuating said first set of pins so that they are extended substantially to their maximum distance while in the region of said re-

ceiving station and are withdrawn within said first rim while in said passage, control means for actuating said second set of pins so that they project substantially entirely through said transfer space, so that said second pins engage the rim of said first wheel in sequence, to promote the complete transfer of the entire tobacco stream from said first to said second wheel, means for actuating said first rim faster than said second rim whereby said stream is first compacted both radially and along its length by the coaction of said first pins and the effect of the different speeds of said rims, said rims being so disposed in said transfer space as to compress said stream transversely between them, said second pins being disposed and actuated to maintain the compressed condition of said stream between said transfer space and said delivery station.

2. A tobacco feed mechanism having an input station for feeding a tobacco stream to a cigarette rod former, said mechanism comprising a first and a second tobacco conveying wheel, a first and a second rim on said first and said second wheel, respectively, means for driving said first rim at a faster rate than and in a direction opposite from that of said second rim, means for supplying tobacco to the rim of said first wheel, means defining a distorted S shaped passage for said stream, said means comprising a first and a second concave each having an inner wall spaced from said first and said second rims, respectively, to form a first and a second arcuate passage portion, respectively, said wheels so spaced as to define a transfer space portion of said passage there between, said transfer space portion interconnecting said first and said second portions to form thereby said S shaped passage, a first and a second set of retractable pins on said first and said second wheel, respectively, means responsive to each rotation of said first and said second wheel for cyclically actuating said first and said second pins radially outwardly and inwardly with respect to their respective rims, so that they are progressively projected both substantially beyond and are withdrawn within said rims, means for controlling the cycle of operation of said first set of pins so that they are extended their maximum distance and pass completely through the layer of tobacco being formed on the rim of said first wheel when the first pins are in the region of said input station, and so that said first pins are substantially in their retracted position when

in said transfer region, means for controlling the cycle of operation of said second pins so that they are substantially in their fully extended position when in said transfer region, in which region each successively engages the opposed rim of said first wheel, to promote the complete transfer of said stream to said second wheel, and so that said second pins are substantially in their retracted position near the end extremity of said second channel, said first rim, first pins, first concave element, and the effect of said faster rate of motion of said first rim coacting to compress the tobacco stream both radially and in the direction of its motion, said first and said second rims being so spaced in said transfer region as to constrict and thereby compress said stream transversely between them, said second pins operating to maintain the compressed condition of said stream in said second channel.

3. A mechanism according to claim **1**, said mechanism comprising a plurality of pairs of wheels corresponding to said first and said second wheels, all of said wheels being arranged in substantial coplanar alignment, and in which said source of tobacco communicates with the receiving station on the first of ecah of said pairs, and in which the delivery station on each of said second wheels of each of said pairs communicates with said rod former.

4. A mechanism according to claim **3** having deflector means disposed between said source of tobacco and said first wheels, and means for actuating said deflector means so as to selectively direct tobacco as desired to predetermined first wheels.

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