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TRANSFER MECHANISMS FOR CIGARETTE MACHINERY

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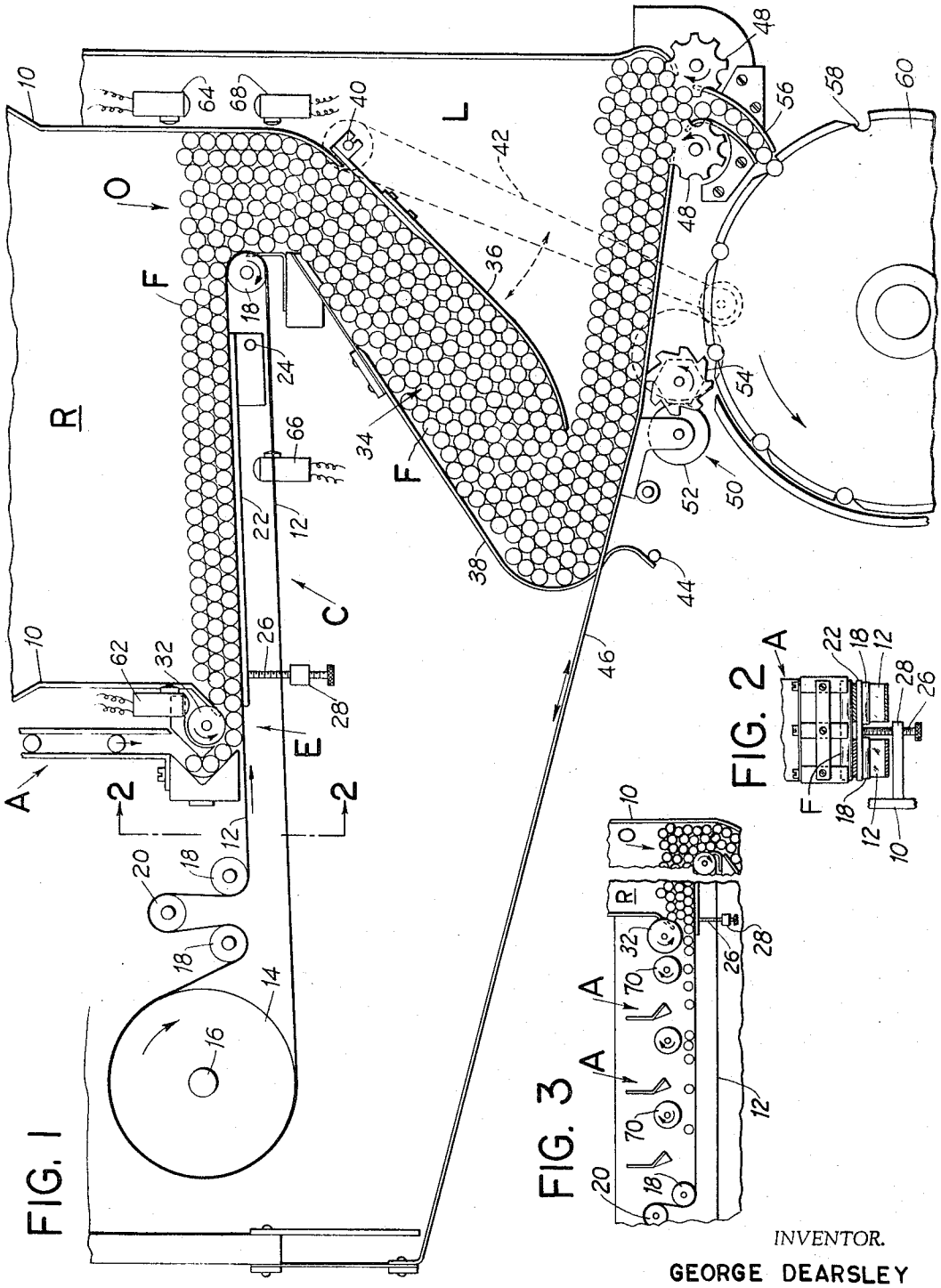

FIG. 1

FIG. 2

FIG. 3

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TRANSFER MECHANISMS FOR CIGARETTE MACHINERY

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The present invention relates to the manufacture of cigarettes and is particularly directed to apparatus in the nature of a reservoir for the storage and delivery of cigarette or filter tip rods in such machines.

The present invention was conceived with direct application to the feeding of filter rods in a filter tip attachment mechanism, i.e., a mechanism for joining the tip and cigarette, and while the following description is so directed, it should be appreciated that it is equally applicable to the delivery of cigarettes and its uses can be effected in other cigarette or cigar manufacturing mechanisms such as packaging machines.

The prior art form of cigarette filter tip attachment is shown in my U.S. Patent 3,036,581 issued May 29, 1962. In that patent there is also shown a particular reservoir combining delivery and storage means. This reservoir of this patent is required to be manually filled with filter tip rods and, therefore, necessitates periodic attention from the operator of the machine.

The cigarette manufacturing industry is presently developing automated machinery interconnecting cigarette making units and packaging machines, and filter rod making or supply units to filter tip attachment units, such as that shown in the heretofore mentioned patent. More specifically, the art is leading to the production of high speed pneumatic coupling and transfer systems in which both cigarette and filter rods are transported over long distances, without manual handling, but with interrelated and interlocked operation and timing. Such coupling systems are shown in my copending application, Serial No. 574,882 filed August 4, 1966 based upon my pending application in Great Britain, No. 34,341/65, filed August 11, 1965 and in U.S. Patent 3,222,110 issued to Kelly et al., December 7, 1965.

Briefly, the system as described in my copending application is capable of automatically transferring cigarettes or filter rods at high speeds and over long distances in a continuous unending stream. While such a system now makes it feasible, for example to link maker units for cigarettes to packaging machines, and maker or supply units for tips directly to attachment machines to eliminate manual operation, the linking cannot economically be done on a one to one basis of production, because of the variations in rate of production, efficiency, etc., of each of the units, wherein one might produce or use rods at a different rate from the other.

Also, it will be appreciated that one of the basic advantages of the automatic transfer system disclosed is that it permits various classes of machinery to be segregated in positions remote from each other, e.g. the manufacture of filter rods is desirably performed quite separately from the manufacture of filter cigarettes. In such cases, the filter tip attachment machine will stop and start as a result of the exigencies of manufacture and the automatic supply of filter rods must follow. This is conveniently achieved by sensing the quantity of filter rods at the attachment, stopping the supply from the remote position when this quantity exceeds a predetermined amount and starting the supply from the remote position when this quantity is deficient.

Owing to the fact that the supply of filter rods may be from mechanism situated in a remote position, the number of rods in transit at any particular instant may be considerable. Thus, when the supply unit is stopped in response to a command from the filter tip attachment, all the rods in transit will continue to be delivered at the attachment which has itself stopped. Thus, it is necessary to provide a reservoir to receive these surplus filters.

When the filter tip attachment is again started, it immediately consumes filter rods and although the command to the supply unit will cause it to start feeding rods into the transfer system, a time lag, dependent upon the distance involved, must inevitably exist before the arrival of the rods at the filter tip attachment. During this period, the surplus previously accumulated in the reservoir will be consumed. From this, it will be clear that such a reservoir acting as a buffer in both directions is highly desirable.

Such a new reservoir is required to be able to automatically receive and keep rods in relative parallel orientation, even though the receipt of the rods are at high speed. The new reservoir is also required to feed such rods at demand in the same oriented fashion. The reservoir is further required to be able to have a variable storage capacity with a predetermined minimum retention and a sufficiently variable capacity to keep receiving rods from a maker even though the feed from the reservoir has stopped.

The reservoir for storage and feeding rods, as exemplified in my heretofore mentioned patent, does not meet the requirements set forth above. Accordingly, it was the prime object of the present invention to provide a reservoir and storage means overcoming the defects of the present structure and satisfying the above requirements. Other objects, as well as the utility and advantages of the present invention will be obvious from the following description and the accompanying drawings in which:

FIG. 1 is a front elevation of a reservoir, in accordance with the present invention, for receiving filter rods, shown in conjunction with the feed drum of a filter tip attachment of a cigarette machine, and;

FIG. 2 is a sectional end elevation of the same, taken on line 2—2 of FIG. 1;

FIG. 3 is a view of a modification of the present invention.

With reference to the drawings, there is shown a reservoir R in conjunction with a lower hopper L. The reservoir R is defined by side and end wall members **10** and a slightly inclined horizontal conveyor C along its bottom. The conveyor C is formed of two parallel spaced endless bands or belts **12** driven by a pulley **14** mounted on a drive shaft **16**. Belts **12** are conventionally led over a plurality of idler rollers **18** and take-up roller **20** to insure proper tension. The upper runs of belts **12**, specifically that portion which forms the bottom wall of the reservoir R, is supported by a plate **22** which at its forward end is pivotably mounted on a stud **24** and at its rearward end rests on the vertical adjusting screw **26** conventionally secured to the back wall.

The screw **26** is threaded through a fixed nut **28** and thus enables the table **22** to be adjustably positioned.

The reservoir is provided with a positive introduction entrance means E located at the rearward end of the conveyor C so that rods F supplied through chute A of a pneumatic transfer means of the type shown in my copending application can be securely introduced therein. The entrance means E comprises a roller **32** which is spaced from, but jointly rotated with the belt **12** of the conveyor C. The means for rotating the roller **32** is conventional and therefore not shown. The roller **32** and belt **12** are spaced from each other a distance

approximately equal to the diameter of the incoming rod F so that the rod will be positively gripped between them.

The adjustability of the supporting plate **22** has the advantage that the space between the feed roller **32** and belts **12** may be so varied to accommodate different diameter rods and for minute adjustment of pressure upon the rod. The chute A is provided with an angular turn which serves the purpose of straightening the rod F and conducting the same serially in horizontal position to the space between the feed roller **32** and the conveyor. The gripping effect of roller **32** and belt **12** has a further advantage of maintaining the rods in orientation.

The rods enter reservoir R and proceed to the forward end of conveyor C. Upon reaching the forward end of the conveyor C, the rods F drop into the lower hopper L through the relatively restricted opening O, the lower hopper L comprising an inclined chamber **34** formed by adjustable agitator plate **36** and a spring mounted yieldable top plate **38**. Agitator plate **36** is pivotably mounted at its upper end **40** and is oscillated in the direction of the dotted arrow in a conventional manner by the arm **42**. The yieldable top plate **38** is also affixed in a conventional manner, however, it is provided with stop means in the form of a pin **44** preventing its complete forward movement. Between the weight of the top plate **38** and its spring mounting sufficient force is exerted on agitator plate **36** to keep the rod F orientation without damage, in the inclined chamber **34**.

From said inclined chamber **34**, the rods F are conducted via a vibrating slanting bottom plate **46** to a pair of counter rotating grooved or toothed spaced rollers **48**. The bottom plate **46** is mounted at one end to a suitable frame structure and the other end is freely resting on an agitating assembly **50** comprising a pair of rollers **52** and **54**, one of which, namely, roller **54**, having a plurality of flat sides The rollers are driven in a conventional manner, the result effecting longitudinal oscillation of bottom plate **46** within direction of the double arrow. The toothed rollers **48** act as a metering gate permitting only one rod at a time to pass between them thus creating a single file formation of said rods. The rods F thereafter pass into the curved channel **56** formed by a pair of spaced guide plates and fall one-by-one into the spaced horizontal grooves **58** of the rotating feed drum **60**.

The oscillating agitator plate **36** which operates in conjunction with the spring mounted top plate **38** has the advantage of being able to supply a sufficient quantity of rods to the rollers **48** without the weight of the bulk of rods in the lower hopper L creating any undesirable pressure in the region of rollers **48**. The agitating bottom plate **46**, insures continued and free movement of the rods to the metering gate.

The apparatus is furthermore so designed that the belts **12** of the conveyor C and the roller **32** which feed the rods into the upper hopper are driven independently of the fed machine, i.e., tip attachment machine so that when, for example, feed roller **60** stops, the rods in the supply line A will continue to be fed into said hopper. An important advantage of the present structure now becomes apparent. The positive feed at the entrance E to the reservoir R, the continued movement of conveyor C and the restricted exiting through hopper L, permits the bubbling up of a plurality of layers of oriented parallel rods F in the reservoir R without any back pressure or interference with the operation of source A and feed roller **32**. In effect, this raises the level of rods above the conveyor level from the bottom up.

The reservoir R is further provided with a suitable photocell system **62–64** which will effect the arrest of the dispensing or delivery of rods from the making machine when the level of rods within the hopper reaches a predetermined height which height may be varied as desired. Thus, should the attachment unit, i.e., feed drum **60**, stop, the light of the photocell system **62–64** will also be interrupted as the reservoir is filled and the supply from the rod making machine will then be stopped. However, the rods enroute or in transit through the pneumatic supply line will, of course, continue to be fed into the reservoir until the line itself is empty. The conveyor C will cause these rods to be stored in reservoir R and the rods so received will be available to the attachment machine upon restarting, avoiding the time delay awaiting the arrival of new rods.

In order to avoid damage to the rods in the reservoir R by the continued movement of conveyor C after stoppage of the tip attachment machine, the drive mechanism for the conveyor C and feed roller **32** may be wired in conjunction with a timer (not shown) in such a manner that they start up instantly with the cigarette machine but are switched off after a predetermined interval after the tipping machine stops permitting the rods in transit to be fed into the reservoir before the whole mechanism comes to rest.

A second photocell system **66–68** is also provided to effect stoppage of the tipping machine in case the rod supply should fail and the reservoir R becomes empty.

In some cases, such as the delivery of cigarettes to packaging machines, a multiple delivery system of rods may be desirable in order to avoid excessive transport and delivery rates. FIG. 3 shows such an arrangement.

It has been found that the angular turn through which the rods pass, as shown at the lower extremity of chute A FIG. 1, may be omitted. Instead, the rods may be delivered directly on to the belt **12**, to be pinched between the roller **32** and the belt for positive feeding into the reservoir. Under these circumstances, a refuser roll **70**, FIG. 3, rotating in the direction shown provides assurance that only one layer of rods can pass on to the roller **32**. The rod delivery A and refuser roll **70** may be repeated any number of times as shown to provide a high rate of delivery from one or more sources, the refuser roll insuring that the most recently delivered rod is properly nested between the rods already on the belt before delivery to the next stage.

It will thus be apparent that the particular requirements of a reservoir for use in automatic transfer means is effected by the present invention. It is further apparent that such a reservoir has numerous uses and embodiments. Accordingly, it will be understood that the present invention should not be limited to the specification and foregoing descriptions.

What is claimed is:

1. In a cigarette manufacturing apparatus having at least one source of supply of rod-like articles and transport and delivery means for the same, a reservoir comprising at least front and rear substantially vertical walls, a restrictive entrance opening adjacent said rear wall for the positive oriented entry of only one rod at a time, and an exit opening spaced from said entrance communicating with means for the receipt of said articles, and a bottom wall bridging the distance between said entrance and said exit comprising a conveyor for carrying and moving said rod from said entrance to said exit, said restrictive opening, said conveyor and said vertical walls cooperating to stack a plurality of layers of rods within said reservoir on the blocking of said exit.

2. The reservoir according to claim **1** in which the bottom wall comprises at least one moving belt on to which the articles are delivered by the transport means and which frictionally introduces the articles into the reservoir.

3. The reservoir according to claim **1** in which the bottom wall comprises at least one moving belt on to which the articles are delivered by the transport means, a roller spaced from and cooperating with said moving belt to grip the articles as they move forwardly to enter the reservoir.

4. The reservoir according to claim 1 in which the bottom wall comprises at least one moving belt on to which the articles are delivered by the transport means, a roller spaced from and cooperating with said moving belt to grip the articles as they move forwardly to enter the reservoir and a refuser roll upstream of the gripping roll also driven in cooperation with the moving belt spaced from said belt sufficiently to permit the free passage of a single stream of articles to the gripping roll but preventing any articles in excess of a single stream from passing.

5. The reservoir according to claim 1 wherein said bottom wall is pivotably mounted at its forward end and vertically adjustable at its rearward end, and includes means for adjustably inclining said conveyor with respect to the horizontal.

6. The reservoir according to claim 1 in which the means responsive to the number of articles in the reservoir provides a signal when a predetermined number of rod-like articles are present in the reservoir which signal stops the source of supply and then, after an adjustable interval of time, stops the moving belt, said interval of time being chosen to insure the delivery into the reservoir of all articles in transit.

7. The reservoir according to claim 6 in which the means responsive to the number of articles in the reservoir provides a signal when the number of articles present in the reservoir falls below a predetermined number, said signal starting the source of supply and the moving belt simultaneously.

8. The apparatus according to claim 1 including a hopper for delivering said rods to a subsequent feeding mechanism and an inclined channel communicating with the exit of said reservoir connecting said reservoir and hopper for the transfer of rods therebetween, said inclined channel being formed of a pair of spaced walls,

at least one of which is movably mounted and is provided with means for causing said walls to tend to converge during transfer of said rods.

9. The reservoir according to claim 8 including means for agitating one of said walls during movement of said rods.

10. The reservoir according to claim 8 wherein the upper of said spaced walls is pivotably mounted at its upper end and the lower of said spaced walls is movably mounted and is provided with means for forcing the same toward said upper wall during transfer whereby both said walls are caused to move in reaction to the number of rods being transferred to vary the incline of said channel.

11. The reservoir according to claim 8 wherein said hopper is provided with a bottom wall inclined with respect to the horizontal to cause said rods to travel thereon in a generally downward direction, metering means for delivering said rods serially from said bottom wall to the feeding mechanism and means for oscillation of said bottom wall in a direction longitudinal thereto so as to feed said rods to said metering means.

12. The reservoir according to claim 8 wherein said inclined channel is located at an angle directed rearwardly of said conveyor and wherein said hopper has a bottom wall at a diverging angle to that of said conveyor whereby said rods are caused to take a tortuous path to the feeding mechanism.

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